MENTAL DEVELOPMENT

IN THE CHILD AND THE RACE

METHODS AND PROCESSES

BY THE SAME AUTHOR

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THE CHILD AND THE RACE

METHODS AND PROCESSES

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PREFACE TO THE FIRST EDITION

(ABRIDGED)

In writing this book I have had rather conflicting aims. It was begun as a series of articles reporting observations on infants, published in part in the journal *Science*, 1890–1892. In the prosecution of this purpose, however, I found it necessary constantly to enlarge my scope for the entertainment of a widened genetic view. This came to clearer consciousness in the treatment of the child's imitations, especially when I came to the relation of imitation to volition, as treated in my paper before the London Congress of Experimental Psychology in 1892. The further study of this subject brought what was to me such a revelation of the genetic function of imitation that I then determined — under the inspiration, also, of the small group of writers lately treating the subject — to work out a theory of mental development in the child, incorporating this new insight.

This occupied my thought, and was made the topic of my graduate *Seminar* in psychology at Princeton, in 1893–1894, the result being the conviction that no consistent view of mental development in the individual could possibly be reached without a doctrine of the race development of consciousness, — *i.e.* the great problem of the evolution of mind.

I then fell to reading again the literature of biological evolution, with view to a possible synthesis of the current biological theory of organic adaptation with the doctrine of the infant's development, as my previous work had led me to formulate it.

This is the problem of Spencer and Romanes. My book is then mainly a treatise on this problem; but the method of approach to it which I have described, accounts for the preliminaries and incidents of treatment which make my book so different in its topics and arrangement from theirs, and from any work constructed from the start with a 'System of Genetic Psychology' in view.

For this reason the question of arrangement was an excessively difficult one to me. The relations of individual development to race development are so intimate — the two are so identical, in fact — that no topic in the one can be treated with great clearness without assuming results in the other. So any order of treatment in such a work must seem finally to be only the least of possible evils.

My final arrangement of chapters presents, however, when a patient reader is in front of the page, a fair degree of reason, I think. The earliest chapters (I. to VI.) are devoted to the statement of the genetic problem, with reports of the facts of infant life and the methods of investigating them, and the mere teasing out of the strings of law on which the facts are beaded — the principles of Suggestion, Habit, Accommodation, etc. These chapters have their own end as well, giving researches of some value, possibly, for psychology and education. They serve their purpose also in the progress of the book, as giving a statement of the central problem of motor adaptation. Chapter V. gives a detailed analysis of one voluntary function, Handwriting. Then follows the theory of adaptation, stated in general terms in Chapters VII. and VIII.; and afterwards comes a genetic view in detail (Chaps. IX. to XVI.) of the progress of mental development in its great stages, Memory, Association, Attention, Thought, Self-consciousness, Volition. So the whole is a whole, the theory resting upon an induction of facts (put before it) and supported by the deduction of facts (put after). It is now (3d ed.) divided into four parts, 'Introduction,' 'Experimental Foundation,' 'Biological Development,' and 'Psychological Development.'

The book really represents, therefore, five years of very close work; and the distribution of the topics over this period accounts for the fact that the chapters, in many instances, include in more or less modified form articles which I have contributed to the reviews. It will now be clear that all were written in the course of development of one intellectual impulse, and so have their only adequate presentation and justification in this volume. I am indebted to the editors and publishers of certain journals for this present use of some of the material, *e.g. Mind, The Philosophical Review, The Psychological Review, The American Journal of Psychology, The Popular Science Monthly, The Century Magazine, Science, The Educational Review.*

There are certain other great provinces, besides, which I find capable of fruitful exploration with the same theoretical principles. Of course, genetic psychology ought to lay the only solid foundation for education, both in its method and its results. And it is equally true, though it has never been adequately realized, that it is in genetic theory that social or collective psychology must find both its root and its ripe fruitage. We have no social psychology, because we have had no doctrine of the *socius*. We have had theories of the *ego* and the *alter;* but that they did not reveal the *socius* is just their condemnation. So the theorist of society and institutions has floundered in seas of metaphysics and biology, and no psychologist has brought him a life-preserver, nor even heard his cry for help. These aspects of the subject I hope to take up in somewhat the same way in another work, already well under way, to bear the same general title as this volume, but to be known by the sub-title, *Social and Ethical Interpretations,* in contrast with the *Methods and Processes*, by which this book is described more particularly on the title-page. It will endeavour to find a basis in the natural history of man as a social being for the theory and practice of the activities in which his life of education, social co-operation, and duty involves him.

Many of the particular points of view of this proposed work are indicated by foot-notes in this volume, on pages where the principles discussed strike deeper into the social life. Such intimations are especially brought out in Chapters X. to XVI.

The classes of men whom I hope therefore to interest are first, of course, psychologists, — in my theories, — and then teachers and writers on education, — in the outcome. I have not had the latter class in mind as much in this book as I do in the later one, for obvious reasons; but yet I hope the treatment will be found untechnical enough to profit teachers who are not professed psychologists. To this end all the original observations and experiments on children which are scattered through the book are gathered in a list in Appendix I.

Then there are the biologists — one almost despairs of them! Are there any yet born to follow the two I have named in finding mind as interesting as life? We must believe that the future is big with them, — and the near future, too. But if any biologist is willing to listen, he may care to recognize in the chorus of those who are singing the praise of the ruler of our time, the naturalist, and playing to him on instruments — the tibia of the archaic horse, the antennæ of the hymenoptera, the many stops of the hydra's legs — the plaintive note of one who but tries to interpret the wail of the human babe! But I am not prepared to dispute the point with any of my readers who find such an expectation quite too optimistic.[1]

[1] The ten years since this was written have brought a remarkable change in the attitude of biologists toward psychology.

There is one point in the range of the great topic of development itself to which I wish to refer, in order to avoid misunderstanding. I believe in the widest possible expansion of the idea of natural history as applied to consciousness. But I also believe that the natural history question is not the same as the question of the essence or nature or explanation of mind. Philosophy has its problem just the same, however consciousness arose, and no amount of evolution theory can settle the problem set by philosophy. I hope to take up this question of 'origin *vs.* nature' later on.[1]

J. M. B.

PRINCETON, N.J., March, 1895.

[1] The reader may now compare the article of that title in the writer's *Dict. of Philos. and Psychol.*

PREFACE TO THE THIRD EDITION

IN passing into this edition this book is celebrating its full decade. It has been reprinted now seven times and translated into French and German, and the demand for it indicates the interest taken in genetic discussions. In view of this new interest, and of the need of it — the need of bringing into psychology the genetic and biological points of view — for which the book originally stood, I have decided to leave it in essentials practically as originally written. The revision has been mainly in matters of details of fact, and of exactness of exposition; but the leading theories, which have had their part in stimulating newer discussions, remain about as originally presented.[1] They are now supplemented by the later volumes of the series, *Social and Ethical Interpretations* (4th edition, 1906), *Development and Evolution* (1902), and the first part of the treatment of Genetic Logic, the work called *Thought and Things* (Vol. I., 1906). I have undertaken to prepare a single volume on the 'Principles of Genetic Science,' in which the leading ideas of this series of books will be thrown together in concise and reasoned form. In that volume the net outcome of the whole endeavour will be estimated and set forth in relation to the latest literature of the several sciences to which these earlier books respectively relate.

In this edition the changes already embodied in the French

[1] The longer additions are to be found in Chap. XV. (on Control, and on Attention), Chap. XVI. (on Pain as Sensation, and on 'Excessive' Pain Reactions), and in Appendix C.

and German versions are now incorporated. On certain pages, moreover, on which topics are treated of which later thought has developed and modified the views expressed reference is made to the publications embodying these further views. This is especially the case with the 'social' matters carried further in *Social and Ethical Interpretations;* with the biological matters, especially the theory of evolution by organic selection, worked out in the volume *Development and Evolution;* with the motor theory of general notions which is essentially developed and also restricted in the sections on 'General Meaning' in *Thought and Things,* where the treatment of the cognitive operations is full and explicit. Readers who care to follow out any of these matters are thus supplied with data for judging of the writer's more extended views. In the literary citations added in the course of the work the reader will find indications of personal judgment upon the newer publications. I cannot refrain from making more specific reference here, however, to Principal Lloyd Morgan's *Habit and Instinct,* Professor Groos' *Play of Animals* and *Play of Man,* and Professor Jennings's *Behaviour of Lower Organisms.* In these books certain of the positions of this work have been notably confirmed, corrected, and advanced.

J. M. B.

Johns Hopkins University,
Baltimore, October, 1906.

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INTRODUCTION

CHAPTER I

INFANT AND RACE PSYCHOLOGY

THE study of psychology has had so remarkable a development in recent years, and the standpoint from which it is now approached is so unlike the point of view of older writers on mental philosophy, that the several departments which it now comprises stand in need of separate introductions; and not only are such introductions necessary for purposes of exposition, but their apologetic function, though reduced to a minimum, is still real. The expression 'nursery psychologist' no doubt means what its author intended it to mean, to some others than himself; and it is desirable that it should be understood by the educated public as a badge of honourable service rather than as a phrase of disparagement and discredit.

§ 1. *Infant Psychology: Ontogenesis*

No doubt we owe to the rise of the evolution idea something at least of the benefit brought about by what we may call the psychological renaissance of the last twenty-five

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§ 1. *Infant Psychology: Ontogenesis*

No doubt we owe to the rise of the evolution idea something at least of the benefit brought about by what we may call the psychological renaissance of the last twenty-five or thirty years. The breadth of the current conception of psychology is certainly in harmony with the conceptions long ago current in other departments of scientific research; but there is a phase of this broadening of psychological inquiry strikingly brought out only when interpreted in the light of evolution doctrine. This is what we may call the genetic phase, the growth phase. The older idea of the soul was of a fixed substance, with fixed attributes. Knowledge of the soul was immediate in consciousness, and adequate; at least, as adequate as such knowledge could be made. The mind was best understood where best or most fully manifested; its higher 'faculties,' even when not in operation, were still there, but asleep.

Under such a conception, the man was father to the child. What the adult consciousness discovers in itself is true, and wherein the child lacks it falls short of the true stature of soul life. We must, therefore, if we take account of the child-mind at all, interpret it up to the revelations of the man-mind. If the adult consciousness shows the presence of principles not observable in the child consciousness, we must suppose, nevertheless, that they are really present in the child consciousness beyond the reach of our observation. The old argument was this, — and it is not too old to be found in the metaphysics of to-day, — consciousness reveals certain great ideas as simple and original: consequently they must be so. If you do not find them in the child-mind, then you must read them into it.

The genetic idea reverses all this. Instead of a fixed substance, we have the conception of a growing, developing activity. Functional psychology succeeds faculty psychology. Instead of beginning with the most elaborate exhibition of this growth and development, we shall find most instruction in the simplest activity that is at the same time the same activity. Development is a process of involution as well as of evolution, and the elements come to be hidden under the forms of complexity which they build up. Are there principles in the adult consciousness which do not appear in the child consciousness, then the adult consciousness must, if possible, be interpreted by principles present in the child consciousness; and when this is not possible, the conditions under which later principles take their rise and get their development must still be adequately explored.

Now that this genetic conception has arrived, it is astonishing that it did not arrive sooner, and it is astonishing that the 'new' psychology has hitherto made so little use of it. The difference between description and explanation is as old as science itself. What chemist long remains satisfied with a description of the substances found in nature? He is no investigator at all. His science was not born until he became an analyst. The student of philology is not content with a description, a grammar, of spoken languages: he desiderates their reduction to common vocal elements, and aims to discover the laws of their genetic development. But the mental scientist has called such description science, even when he has had examples of nature's own furnishing around him which would have confirmed or denied the results of mental analysis.

The advantages which we look to infant psychology to furnish, meet just this need of analysis; and the reason that the needed analysis is found here, is that the mind, like all other natural things, grows. This general statement may be put into concrete form under several points, which divide this branch of general psychology from others now recognized.

1. In the first place, the phenomena of the infant con-

sciousness are simple as opposed to reflective; that is, they are the child's presentations or memories simply, not his own observations of them. In the adult consciousness the disturbing influences of inner observation is a matter of notorious moment. It is impossible for me to know exactly what I feel, for the apprehending of it through the attention alters its character. My volition also is a complex thing of alternatives, one of which is my personal pride and self-conscious egotism. But the child's emotion is as spontaneous as a spring. The effects of it in the mental life come out in action, pure and uninfluenced by calculation and duplicity and adult reserve. There is around every one of us a web of convention and prejudice of our own making. Not only do we reflect the social formalities of our environment, and thus lose the distinguishing spontaneities of childhood, but each one of us builds up his own little world of seclusion and formality with himself. We are subject not only to 'idols of the forum,' but also to 'idols of the den.'

The child, on the contrary, has not learned his own importance, his pedigree, his beauty, his social place, his religion, his paternal disgrace; and he has not observed himself through all these and countless other lenses of time, place, and circumstance. He has not yet turned himself into an idol nor the world into a temple; and we can study him apart from the complex accretions which are the later deposits of his self-consciousness.

Perhaps one of the best illustrations we can find of the value of this consideration in the study of the child-mind is seen in the reversion to the child-type occasioned by hypnotism. One of the signal services of hypnotism, I think, is the demonstration of the intrinsic motor force of an idea. Any idea tends at once to realize itself in action. All conventionalities, proprieties, alternatives, hesitations, are swept away, and the developed mind reveals its skeleton structure, so to speak, its composition from reactive elements. But hypnotism need not have been waited for to show this. The patient observation of the movements of a child during his first year would have put it among the safest generalizations of the science of mind. In the absence of alternative considerations, reflections, the child acts, and act it must, on the first suggestion which has the faintest meaning in terms of its sensations of movement.

2. The study of children is often the only means of testing the truth of our mental analyses. If we decide that a certain complex product is due to a union of simpler mental elements, then we may appeal to the proper period of child-life to see the union taking place. The range of growth is so enormous from the infant to the adult, and the beginnings of the child's mental life are so low in the scale, in the matter of mental and moral endowment, that there is hardly a question of analysis now under debate which may not be tested by this method.

On the other hand, that such confirmation shuts out most conclusively the advocates of irreducibility in many cases, seems to admit of no question. A good example of such analysis is seen in the distinction between simple consciousness and self-consciousness. Over and over again have systems been built upon the subject-object theory of consciousness; namely, that personality, subjectivity, consciousness in any form, necessarily implicated an antithesis, in consciousness, between *ego* and *non-ego*. But an example of what is thus denied may be seen upon the floor of any nursery where there is a child less than six months of age.

At this point it is that child psychology is more valuable than the study of the consciousness of animals. The latter never become men, while children do. The animals represent in some few respects a branch of the tree of growth in advance of man, while being in many other respects very far behind him. In studying animals we are always haunted by the fear that the analogy may not hold; that some element essential to the development of the human mind may not discover itself at all. Even in such a question as the localization of the motor functions of the brain, where the analogy is one of comparative anatomy and only secondarily of psychology, the monkey presents analogies with man which dogs do not. But in the study of children we may be always sure that a normal child has in him the promise of a normal man.

The contrast between this branch of psychology and mental pathology also shows points of advantage on the side of the former. In the study of mental disease all the mental functions are or may be involved. We are never sure that functional connections and sympathies have not been developed in the growth of the personality as a whole, which are liable to derangement with other processes very remote from them. For example, instinct is modified by the growth of volition; so that in cases of diseased volition, we do not find that the instincts corresponding to those of the creatures which do not attain volition are left intact. For this reason the application of the logical 'method of difference,' which consists in observing the change brought about in a phenomenon from the removal of part of its antecedent conditions, cannot be always relied upon. It is further true that, in the child, the whole nature is growing together, so that the absence of one function does not mean the violent uninhibited exercise of others, as is the case with diseased adult patients.

One of the same difficulties confronts the student of animal pathology. The indefinite source of error called 'shock' is always present. The organs left intact by the disease or by the operator 'sympathize' in the sufferings of the organism as a whole; and sometimes loss of function is reported, when time afterwards repairs the damage.

In dealing with the child, however, the same advantage of simplicity is secured without the corresponding disadvantage of possible interference of functions. In other words, the simplicity of the child is normal simplicity, while the simplicity of disease or surgery is abnormal simplicity; and the danger of what physicians call 'complication' is in the former case entirely ruled out.

3. Again, in the study of the child-mind, we have the added advantage of a corresponding simplicity on the organic side; that is, we are able to take account of the physiological processes at a time when they are relatively simple. I say 'relatively simple,' for in reality they are enormously complex at birth, and the embryologist pushes his researches much farther back in the life history of the organism. But yet they are simple relatively to their condition after the formation of habits, motor complexes, brain connections and associations; in short, after the nervous system has been educated to its whole duty in its living environment. For example: a psychology which holds that we have a 'speech faculty,' an original mental endowment which is incapable of further reduction, may appeal to the latest physiological research and find organic confirmation, at least as far as a determination of its cerebral apparatus is concerned; but such support for the position is wanting when we return to the brain of the infant. Not only do we fail to find the series of centres into which the organic basis of speech has been divided, but even those of them which we do find have not taken up the function, either alone or together, which they perform when speech is actually realized. In other words, the primary object of each of the various centres involved is not speech, but some

other and simpler function; and speech arises by development from a union of these separate functions.

We accordingly find a development of consciousness keeping pace with the development of the physical organism. The extent of possible analogies between the growth of body and that of mind may thus be estimated from below; and any outstanding facts of the inner life which cannot be correlated with facts of the physical organism get greater prominence and safer estimation.

4. In observing young children, a more direct application of the experimental method is possible.[1] By 'experiment' here, I mean both experiment on the senses and also experiment directly on consciousness by suggestion, social influence, etc. In experimenting on adults, great difficulties arise through the fact that reactions — such as performing a voluntary movement when a signal is heard, etc., — are broken at the centre by deliberation, habitual desire, choice, etc., and closed again by a conscious voluntary act. The subject hears a sound, identifies it, and presses a button — *if he choose* and agree to do so. What goes on in this interval between the advent of the incoming nerve process and the discharge of the outgoing nerve process? Something, at any rate, which represents a brain process of great complexity. Now, anything that fixes this sensori-motor connection or simplifies the central process, in so far gives greater certainty to the results. For this reason, experiments on reflex reactions are valuable and decisive where similar experiments on voluntary reactions are uncertain and of doubtful value. Now the fact that the child consciousness is relatively simple, and so offers a field for more fruitful experiment, is illustrated in what is said in the following pages about suggestion in

[1] On the nature and application of experiment in psychology, see my *Handbook of Psychology*, I., 2d ed., pp. 25–31.

infant life; it is also seen in the mechanical reactions of an infant to strong stimuli, such as bright colors, etc.[1] Of course, this is the point where originality must be exercised in the devising and executing of experiments. After the subject is a little better developed, new experimentation will be as difficult here as in the other sciences; but at present the simplest phenomena of child life and activity are open to the investigator.

With this inadequate review of the advantages of infant psychology, it is well also to point out the dangers of the abuse of such a branch of inquiry. Such dangers are real. The very simplicity which seems to characterize the life of the child is often extremely misleading, and misleading because the simplicity in question is not always typical but may be to a degree individual. Mr. Spencer had a large range of facts in view when he said that organic development involved progress not only in complexity, but also in definiteness; and the distinction between simplicity which indicates mere absence of complexity, and that which indicates definiteness of function as well, applies with great force to mental growth. Two nervous reactions may appear equally simple; but one may be an adaptive reaction learned with great pains and really very complex in its elements, while the other may be inadaptive and really simple. So a state of infant consciousness may seem to involve no complexity or integration, and yet turn out to represent, by reason of its very apparent simplicity and definiteness, a mass of individual or race development. It is a corollary from this that children differ under the law of heredity very remarkably, even in the simplest manifestations of their conscious lives. It is never safe, except under the qualifications mentioned below, to say,

[1] See below, Chaps. III. to VI.

'This child did, consequently all children must.' The most we can usually say in observing single infants is, 'This child did, consequently another child may.' Yet the uncertainties of the case may be summed up and avoided if certain principles of mental development are kept in view.

1. In the first place, we can fix no absolute time in the history of the mind at which a certain mental function takes its rise. The observations, now quite extensively recorded, and sometimes quoted as showing that the first year, or the second year, etc., brings such and such developments, tend, on the contrary, to show that such divisions do not hold in any strict sense. Like any organic growth, the nervous system may develop faster under more favourable conditions, or more slowly under less favourable; and the growth of mental faculty is largely dependent upon such organic growth. Only in broad outline and by the widest generalization can such epochs be marked off at all.

2. The possibility of the occurrence of a mental phenomenon must be distinguished from its necessity. The occurrence of a single clearly observed event is decisive only against the theory according to which its occurrence under the given conditions may not occur; that is, the cause of the event is proved not to lie among agencies or conditions which are absent. For example: the very early adaptive movements of the infant in receiving its food cannot be due to volition; but the case is still open for the question, what is the sufficient reason of their presence, *i.e.* how much nervous development is present, how much experience is necessary, etc. It is well to emphasize the fact that one case may be decisive in overthrowing a theory, but the conditions are seldom simple enough to make one case decisive in establishing a theory.

3. It follows from the principle of growth itself that the

order of development of the mental functions is constant, and normally free from variation; consequently, the most fruitful observations of children are those which show that such a function was present *before another* could be observed. The complexity becomes finally so remarkable that there seems to be no before or after at all in mental things; but if the child's processes show stages in which any element is clearly absent, we have at once light upon the law of growth. For example: if a single case is conclusively established of a child's drawing an inference before it begins to use words or significant vocal sounds, the one case is as good as a thousand to show that thought develops to a degree independently of spoken language.[1]

4. While the most direct results are acquired by systematic experiments with a given point in view, still general observations kept regularly, and carefully recorded, are important for the interpretation which a great many such records may afford in the end. In the multitude of experiences here, as everywhere, there is strength. Such observations should cover everything about the child, — his movements, cries, impulses, sleep, dreams, personal preferences, muscular efforts, attempts at expression, games, favourites, etc., — and should be recorded in a regular day-book at the time of occurrence. What is important and what is not, is, of course, something to be learned; and it is extremely desirable that any one contemplating such observations should acquaint himself beforehand with the principles of general psychology and physiology, especially the former, and seek also the practical advice of a trained observer.[2]

[1] Yet even this rule is subject to the modifications given below in this chapter, § 4, II.

[2] See Chap. XII., § 3, below, on the method of observing children's imitations.

§ 2. *Race Psychology: Phylogenesis*

If we adopt a distinction in terminology which the biologists use, and call the development of a single life or mind its *ontogenesis*, and, on the other hand, call the life history of the race, or of consciousness in all the forms of animal life, the *phylogenesis* of mind, it will be seen that what I have said about infant psychology falls under the former head. Before we proceed to take up the special questions to which this book is devoted, it may be well to indicate the place of phylogenetic inquiry.

The phrase 'Race Psychology' is commonly used in a narrow sense, having reference to the characteristic mental peculiarities of various peoples, tribes, stages of civilization, cults, etc. That is, the word 'race' is applied to the human race. The points of comparison, on the other hand, between human and animal consciousness, fall under so-called Comparative Psychology. I take the liberty, however, of extending the meaning of the former phrase to include the history of consciousness, very much as the phrase 'race experience' is used to include the full wealth of inheritance derived, as it is held to be, from ancestral life of whatever kind. The problem of 'race psychology' then becomes the problem of the phylogenetic development of consciousness, just as 'individual psychology' deals with its ontogenetic development, both being legitimate branches of genetic as opposed to analytic psychology.

The question of race psychology, as thus understood, is an extremely important and, until very lately, a greatly neglected question. The presumption in favour of mental phylogenesis, arising from the modern evolution theory in biology, cannot be duly weighed without the most careful and detailed comparative work and the fairest interpretation of the concomitance existing between nervous and mental growth everywhere. So far as theoretical human psychology has to do with questions of the nature of mind, as opposed to questions of function, it is, I hold, largely independent of questions of origin; but so far as data of origin must be included in the answer to questions of function, just so far do they come to throw light on the deeper problems of the nature of the mind as well.[1]

Assuming, then, that there is a phylogenetic problem, — that is, assuming that mind has had a natural history in the animal series, — we are at liberty to use what we know of the correspondence between nerve process and conscious process, in man and the higher animals, to arrive at hypotheses for its solution:[2] to expect general analogies to hold between nervous development and mental development, one of which is that between race history epochs and individual history epochs through the repetition of phylogenesis in ontogenesis, called in biology 'Recapitulation'; to view the plan of development of the two series of facts taken together as a common one in race history, as we are convinced it is in individual history by an overwhelming weight of evidence; to accept the criteria established by biological research on one side of this correspondence, — the organic, — while we expect biology to accept the criteria established on the other side by

[1] For a later full discussion of 'Origin *vs.* Nature,' see the writer's article on that topic in his *Dictionary of Philosophy*, II.

[2] Such a hypothesis is that of a 'uniform psycho-physical connection' which is commonly held to apply in two great spheres in which it has not as yet been proved, viz. the sphere of volition (see, however, Chap. XIV. below) on the one hand, and that of the lower nervous centres on the other. The two questions which uniformity supposes answered in the affirmative are, accordingly: has volition a nervous process? and, do the lower nervous ganglia have consciousness? The theory of 'Psycho-physical Parallelism' has detailed discussion in the later volume in this series, *Development and Evolution* (Chap. I.).

psychology; and, finally, to admit with equal freedom the possibility of an absolute beginning of either series at points, if such be found, at which the best conceived criteria on either side fail of application. For example: if biology has the right to make it a legitimate problem whether the organic exhibits a kind of function over and above that supplied by the chemical affinities which are the necessary presuppositions of life, then the psychologist has the equal right, after the same candid rehearsal of the facts in support of his criteria, to submit for examination the claim, let us say, that 'judgments of worth' represent a kind of deliverance which vital functions as such do not give rise to.

The chapters of this book will be found, in various places, to involve all these determinations respecting genetic psychology. One of them, however, — that which relates to the analogy between individual and race growth, — carries so many preliminary suggestions and yet has received so little enforcement in the literature of the topic, that it is well to present it at the outset with greater fulness.

§ 3. *Analogies of Development*

Students of biology consider the argument for organic evolution especially strong in view of the analogy between race and individual development. The individual in embryo passes through stages which represent morphologically, to a degree, the stages actually found in the ancestral animal series. A similar analogy, when inquired into on the side of consciousness, seems on the surface true, since we find more and more developed stages of conscious function in a series corresponding in the main with the stages of nervous growth in the animals; and then we find this growth paralleled in its great features in the mental development of the human infant.

The race series seems to require, both on organic grounds and from evidence regarding consciousness, a development whose major terms are somewhat in this order,[1] *i.e.* simple contractility with the organic analogue of pleasure and pain; nervous integration corresponding to the sense functions, including the congeries of muscular sensations, and some adaptive movements; nervous integration to a degree to which corresponds mental presentation of objects with higher motor organization and reflex attention; greater co-ordination, having on the conscious side memory, conscious imitation, impulse, instinct, instinctive emotion; finally, cerebral function with conscious thought, voluntary action, and ideal emotion. Without insisting on the details of this sketch — intended at this point for no more than a sketch — certain great epochs of functional differentiation may be clearly seen. First, the epoch of the rudimentary sense processes, the pleasure and pain process, and simple motor adaptation, called for convenience the 'affective epoch': second, the epoch of presentation, memory, imitation, defensive action, instinct, which passes by gradations into, third, the epoch of complex presentation, complex motor co-ordination, of conquest, of offensive action, and rudimentary volition. These, the second and third together, I should characterize, on the side of consciousness, as the 'epoch of objective reference.' And fourth, the epoch of thought, reflection, self-assertion, social organization, union of forces, co-operation; the 'epoch of subjective reference,' which, in human history, merges into the 'social and ethical epoch.'

In the animal world these terms form a series — evident enough on the surface — its terms not sharply divided

[1] Some of these points have discussion in later chapters.

from one another, not in most instances exclusive before and after; but representing great places for emphasis, stages of safe acquirement, and outlooks for further growth. So we find the invertebrates, the lower vertebrates, the higher vertebrates up to, or somewhere near, man, and man — four stages.

The analogy of this series, again, with that of the infant's growth, is, in the main, very clear: the child begins in its pre-natal and early post-natal experience with blank sensations and pleasure and pain with the motor adaptations to which they lead, passes into a stage of apprehension of objects with response to them by 'suggestion,' imitation, etc., gets to be more or less self-controlled, imaginative, and volitional, and ultimately becomes reflective, social, and ethical.

On the side of consciousness, however, we are able safely to divide our functional epochs a little more minutely, and in those of the following chapters in which ontogenetic development is our main point of inquiry this is done.

A single further distinction is in point here, however; a distinction also further justified in a subsequent connection.[1] It is evident that if the objective epoch precedes the subjective — if the child gets objects and reacts upon them at first without reflection, and only later deliberates upon their meaning to himself, and then aims at his own pleasure or profit in his behaviour toward them — it is evident that there will be a great difference between the way he looks at other persons at these two stages of his growth respectively. Before he understands himself, that is, during the objective epoch, he cannot understand others, except as they are also

[1] Below, Chap. VI., § 3, and Chap. XI., § 3; also the volume *Social and Ethical Interpretations*, especially Chap. I. The development of the object mode is worked out in detail in the treatise *Thought and Things*, Vol. I. (1906).

objects of a certain kind; but in learning to understand himself, he also comes to understand them, as like himself, that is, as themselves having objects to act toward and upon just as he does. Here are, therefore, four very distinct phases of the child's experience of persons not himself, all subsequent to his purely *affective* or pleasure-pain epoch; first, persons are simply *objects*, parts of the material going on to be presented, mainly sensations which stand out strong, etc.; second, persons are very peculiar objects, very interesting, very active, very arbitrary, very portentous of pleasure or pain. If we consider these objects as fully presented, *i.e.* as in due relationship to one another in space, projected out, and thought of as external, and call such objects again *projects*, then persons at this stage may be called *personal projects*. They have certain peculiarities afterwards found by the child to be the attributes of personality; third, his own actions issuing from himself, largely by imitation, as we shall see, in response to the requirements of this 'projective' environment, having his own organism as their centre and his own consciousness as their theatre, give him light on himself as *subject;* and, fourth, this light upon himself is reflected upon other persons to illuminate them as also subjects, and they to him then become *ejects* or social fellows.

I insist upon this series of distinctions here, even though it be necessary to refer the reader ahead in my text for further justification of them; since it is the fundamental disregard of them which has vitiated much of the earlier work in infant and social psychology. The familiar 'psychologist's fallacy,' a fallacy which is so easy a refuge for inadequate insight, and so ready a screen for faulty analysis, will be permanently exposed only by the adoption of terms which forbid appeal to it. If by 'project' of persons we understand the infant's consciousness of others before he is conscious of himself, by 'subject' his consciousness of himself, and by 'eject,' as Clifford suggested, his consciousness of other persons as similar to himself, we have, I think, safer terms than before, and, at the same time, full opportunity to define the content of each as the facts may require.

The parallelism with animal development is quite clear from this new point of approach. The only stage for which an evident analogy has not been pointed out by other writers is that called 'projective.' Now in the fact of herding, common life and arrangements for the protection of the herd, animal societies of various kinds, animal division of labour, etc., — whatever be the origin of it, — we have what seems to be such an epoch in animal life. These creatures show a real recognition of one individual by another, and a real community of life and reaction, which is quite different from the individualism of a purely sensational and unsocial consciousness. And yet it is just as different from the reflective organization of human society, in which the self-consciousness and personal volition of the individual play the most important rôle.[1] I see no way of accounting for the gregarious instinct anywhere, except on the assumption of such an epoch of animal consciousness.

We thus reach what I think is a valuable distinction in the interpretation of animal action, and avoid what has been a repetition of the 'psychologist's fallacy' habitual with naturalists. It is just as great a mistake to account for human society in terms of the gregarious instinct of animals, however we may account for this instinct, as it is to explain human reflective altruism by the organic sympathy of the lioness with her cub. In each of these cases we are anticipating a later stage of a single process of growth, because,

[1] The 'social' life of certain of the *hymenoptera*, notably bees and ants, illustrates an extreme 'projective' social development embodied in instinct.

being at this later stage ourselves, we are able to anticipate it; and by thus levelling the higher down to the lower, we are failing to recognize the essential process by which, and by which alone, all through the whole organic evolution, higher functional forms are reached by development from lower.

§ 4. *Variations in Ontogeny*

Even in the great darkness which obscures the relation of race to individual development, two modifications seem plainly necessary of the common biological theory of Recapitulation, according to which there is a strict parallel between them.[1]

I. The continued application of the principles of organic Habit and Accommodation, with the perpetuation of their results either by natural selection alone or with the inheritance of characters acquired by individual creatures, leads to certain organic 'short-cuts' — the omission in future descendants of certain elements or stages which were necessary in the progress of their ancestors.

Let us look first at Habit, and put the case, at the outset, abstractly. A particular function involving elements *a*, *b*, *c*, etc., in a dog, for example, may, by the habitual exercise of this function, in later modes of life and different environment, come to involve only the elements *a*, *c*, etc. This is actually seen in well-known examples, such as the difference between dogs, together with rabbits and lower creatures

[1] See also Chap. XVI., § 4, below. Perhaps the best and most readable statement of the present standing of the theory of 'Recapitulation' is the late Professor A. M. Marshall's President's Address before the British Association at Leeds in 1890, reprinted as Chap. XIII., 'The Recapitulation Theory,' in Marshall's *Biological Lectures and Addresses* (1894). The names associated with the theory are Ernst von Baer, Louis Agassiz, Fritz Müller, Haeckel, and Balfour. The standing of the theory is not materially changed to-day (1906).

generally, on one side, and monkeys and men on the other side, in regard to certain sense functions. If the cortical centre for sight be extirpated in a dog, he becomes temporarily blind, recovering his sight after some days by what is supposed to be the reinstatement of a lower centre in the function which belonged to it in ancestral forms; this lower centre is the *b* of the *a*, *b*, *c* series. But when monkeys or men lose their sight by reason of a lesion of the cortical centre for vision in the occipital lobe they never recover it. In this case the lower centre has *lost its ability* to constitute itself a sight centre, — it is no longer necessary as a term in the series of organs involved in the function, — and *a*, *c*, etc., represents the series. This 'short-cut' is inherited or selected and so represents a departure from phylogeny. As I have said elsewhere: "In organisms in which the reflex reactions predominate, in which the 'downward' growth has led to the consolidation of the greater part of the system in ganglionic centres, we would expect that the higher functions, the centres for complex delicate movements, would be more dependent and unformed. Consequently, when they are interfered with, the ganglionic centres, being still in close anatomical connection with them, would regain the function which they formerly performed. Thus sensori-motor ganglionic connections which have fallen into disuse through the growth of higher centres recover their lost activity under the stimulus of a serious and dangerous lesion. It is nothing more than a reversion of function by a reverse process of adaptation. On the other hand, in the case of man, the law of 'upward' growth has reached its fullest application; the cortical centres have become independent of their ganglionic *confrères*, and, in the loss of the former an irreparable damage is sustained. In this latter case, it is a general in the army who has fallen, and no subordinate officer can fill his place;

in the former case, it is a captain that is lost and his lieutenant is easily promoted."[1]

Referring to this hypothesis which I have called the 'short-cut' theory, in its application to muscular movement, the application which has especial interest for us later on, Foster says:[2] "It is possible to maintain the thesis that man has become so developed as to his nervous system and the motor cortex, so accustomed to make use exclusively of the pyramidal system, that the will has lost the power, still possessed by the lower animals, to gain access, by some path other than the pyramidal one, to the immediate nervous mechanisms of thought."

The practical result, in the case of this particular illustration, which recurs in our later discussion,[3] may be put very briefly thus: *it is possible that animals may perform movements which seem to be voluntary, with a nervous apparatus which would be inadequate to their voluntary performance by the child or the man.*[4] And this is to say that man in his individual development does not pass through the stage represented by the animal's performance of this function with this apparatus.

In the fact of Accommodation or adaptation, we find a similar influence at work to modify the strict parallel required by the theory of Recapitulation. By accommodation, with the new adaptations which it works, old habits are broken up, and new co-ordinations are made, which are more complex, or new organic growths secured, which simplify a function. These gains are again clinched by heredity or selection and

[1] *Handbook of Psychology*, Vol. II., p. 46.

[2] *Textbook of Physiology*, 5th ed., III., p. 1062.

[3] Below, Chap. XIII.

[4] I have, in reference to this formulation, the opinion of Professor H. F. Osborn, that 'this is probably supported by the comparative anatomy of the cortex.'

constitute further variations from phylogeny. This is particularly evident in volition. Foster again notes this in the quotation which follows, citing the same structure as in the earlier quotation, the pyramidal tracts. He does not appear to see the application of the two opposite principles which I have mentioned, however; for he does not make it clear that in one case, the latter, he is dealing with the question of the origin of the pyramidal tracts by new adaptations, and in the other, with the organic fixing of these tracts for purposes of voluntary movement. He says:[1] "When we pass in review a series of brains from the lower to the higher, and see how the pyramidal system is, so to speak, grafted on to the rest of the brain, when we observe how the increasing differentiation of the motor cortex runs parallel to the increasing possession of skilled, educated movements, we may perhaps suppose that 'a short-cut' from the cortex to the origins of the several motor nerves, such as is afforded by the pyramidal fibres, from the advantages it offers to the more primitive path from segment to segment along the cerebro-spinal axis, has by natural selection been developed into being in man the chief and most important instrument for carrying out voluntary movements."

This influence of Accommodation means, therefore, in this particular case, that *animals may have nervous apparatus strikingly similar to that of man in many of its parts and still not be able to perform the functions which are performed by those parts in man.* And the reason of it is, again, that man has got a certain apparatus set aside for a higher function without first using it for the lower function for which the animal used it. In this again, we must recognize departure from strict Recapitulation.

The degree to which a simple structural device may pre-

[1] *Loc. cit.*, p. 1063.

serve its type of action while adapting itself to new conditions, and assuming functions which, so far as their value, end, and conscious character are concerned, are new — this is simply extraordinary. And all the more so when we go to consciousness for the criterion of difference in function. I shall illustrate this further in what I call the principle of 'lapsed links' in the discussion of imitation below, and also in connection with the theory of the genesis of emotional expression.[1] The self-repeating or 'circular' reaction, to which the name 'organic imitation' is given in the later pages, is seen to be fundamental and to remain the same, as far as structure is concerned, for all motor activity whatever: the only difference between higher and lower function being, that in the higher, certain accumulated adaptations have in time so come to overlie the original reaction, that the conscious state which accompanies it seems to differ *per se* from the crude imitative consciousness in which it had its beginning.

These positions, it is clear, suggest modifications of that doctrine of ontogenesis which holds that it closely epitomizes phylogenesis. It is evident that while the organism develops serially in regular stages, yet often the stages in the individual's growth represent directly later stages in the series of animal structures, without having passed through all the earlier stages.[2] To use the same example, which is *apropos* to our later topics, we could not hold that the infant first gets voluntary movement by using the intra-segmental pathways, and then later, by developing the pyramidal tracts and their connections, transfers its voluntary function to these. Yet this latter has been, probably, the course of phylogenesis.

[1] Chap. X., § 2, for the first reference and Chap. VIII., § 4, for the second.

[2] Professor C. S. Minot thinks this is the case with structures, the material going directly to make up later organs. 'For example,' he says, 'the gill-arches make the branchian apparatus in fishes, but the neck in man.'

On the contrary, we find that the infant does not act voluntarily at all until he acts *via* the pyramidal tracts and their central connections. The stage of intra-segmental voluntary action which, if it exists, represents in certain animals a stage of development, is lacking altogether in the ontogenetic series.[1]

Similarly, we find a remarkable illustration on the side of Accommodation. On the strict interpretation of the doctrine of Recapitulation we should find the child first passing through a stage of very varied and admirable instinctive adjustments, — corresponding to the instinctive equipment of the brutes, — and then later losing these instincts when it learns to act voluntarily. But the child shows nothing of the kind. We find instead that he passes directly from the suggestive, sensori-motor, stage, which is much lower and earlier in the phylogenetic series than the extreme instinctive stage, directly to the volitional stage. He accomplishes this by direct inheritance of the highly differentiated organism which has arisen through the exercise of conscious mental selection with heredity or through natural selection,[2] and so omits, in his individual development, a great mass of phylogenetic details.

[1] Cf. Edinger's account of the fœtal and early development of the pyramidal tracts in his *Structure of the Central Nervous System.*

[2] It will have been noticed that in using the phrase 'heredity, or natural selection,' I offer either of the current biological views of heredity. I do not think the current controversy over 'acquired characters' is pertinent to this topic: for Weismann's supplementary hypotheses in support of neo-Darwinism are so evidently framed to reinstate all the explanations of the doctrine of use with heredity, that it makes little difference which side is right. If the effects of experience are preserved sufficiently to secure evolution, as we find it, it becomes an extremely interesting biological problem to be sure, but not a matter of much philosophical importance whether the method is use with heredity or variation with selection. See further discussion below, Chap. VII., § 3. The writer's own theory of 'Organic Selection' — a form of Darwinism — is presented in detail in the volume *Development and Evolution* (1902).

The probability of such a modification of the doctrine of ontogenesis occurs to us also in a later connection as a corollary from the psychological theory of Habit.[1] The question is raised whether the effects of habit, itself a phenomenon of development, would not be inherited, or selected, thus abbreviating the ontogenetic process. A child, for example, by possessing a direct tendency to respond to a visual stimulus with movements of the tongue and larynx, would be saved the long course of development which has been necessary phylogenetically for the establishing of the direct connection, now very generally held to exist, between the visual and motor-speech centres, with a corresponding saving on the mental side. A striking illustration is seen, also, in the infant's behaviour in regard to space. A strict reproduction of the phylogenetic order would require that the child should first see the spatial dimensions with all the exactitude of the young of some of the animals, and then afterwards develop the apparatus for learning space properties by a very gradual experience, at the same time losing the former apparatus and with it his instinctive knowledge of space.

These considerations also seem, from the psychological side, to support the general theory of 'race experience' as held by the evolutionists of both schools. The whole tendency of current psychology is toward a functional view of experience, *i.e.* toward the view that memory is a form of mental reinstatement or habit, that character is disposition for action, that the brain develops by enlargement of function on the basis of earlier function, and that the mind proceeds upon its past, even when it does not know its indebtedness. The value of ancestral experience is seen in what it makes me to be for opinion and action now — by whatever process it may have come down from my father to myself.

[1] Below, Chap. XVI., §§ 2, 3.

Now this is what evolution claims for race experience. It says what is present in the mind now, in the way of function, is due somehow to the past. Nervous inheritance provides for the apparatus, and mental inheritance sums up the experience. Hence if individual mental development does not epitomize race development and yet it be true that man has developed, then the 'race experience hypothesis' becomes absolutely essential to genetic psychology, just as animal physiology would be the main resource of human morphology if the animal embryos did not show Recapitulation.[1]

The probabilities point, therefore, from the side of the phylogenesis of mind to very marked modifications of the race record in the growth of the individual. They may finally have to be stated even more strongly than the purely nervous ones are stated, *e.g.* by Balfour, who says: "The time and sequence of the development of parts is often modified, and finally secondary structural features make their appearance to fit the embryo or larva for special conditions of existence. . . . Like the scholar with his manuscript, the embryologist has by a process of careful and critical examination to determine where the gaps are present, to detect the later insertions, and to place in order what has been misplaced";[2] and by Marshall: "It is indeed a history, but a history of which entire chapters are lost, while in those that remain many pages are misplaced and others are so blurred

[1] An interesting line of inquiry has recently been opened up into what is known as 'Neuroses of Development' (cf. Clouston's book with that title), *i.e.* the nervous conditions which arise from the fact of development itself. These states arise at the crises, bridges, 'short-cuts,' in the individual's development; such as the preliminaries of puberty, which probably represent a great series of phylogenetic changes. The theory of 'race experience' as social — not physical — heredity is worked out in *Social and Ethical Interpretations*, Chap. II.

[2] *Comparative Embryology*, p. 3.

as to be illegible . . . and worse still, alterations or spurious additions have been freely introduced by later hands, and at times so cunningly as to defy detection."

II. The second great consideration pertains to the period of infancy, using the term 'infancy' to cover the entire period of an organism's life from germination to independent existence with power to support life alone.

The bearing of the length of the extra-uterine period of infancy — the usual meaning of the term — upon the development of the creature has been shown by Fiske and others to be highly important. Children are, during their long infancy, given parental care and artificial protection, and so enabled to develop slowly to maturity, with all the practice in the acquisition of movements and in general adaptation to artificial conditions of living, etc., which the human intellectual and social environment of the adult demands. A long infancy period is accordingly necessary to his being a man; the child must have time, nourishment and protection during the time, and finally instruction.

Biologists are now recognizing a corresponding group of modifying circumstances brought to bear also during the prenatal period, which is simply an earlier stage of infancy. The course of development of the embryo is dependent upon the presence and amount of food, called 'food-yolk,' which the egg supplies. A principle has been formulated which connects the ontogenetic stages of growth directly with the food-yolk supply, *i.e.* a plentiful supply of food-yolk tends to a direct development toward maturity, to the abbreviation, consequently, of the recapitulation process, and to the birth of the creature ready formed for separate and independent existence.[1]

[1] See Marshall's discussion of the influence of the food-yolk supply, *Biological Lectures*, XIII.

In this matter of the interpretation of the whole infancy period, including both prenatal and postnatal infancy, however, there seem to be two influences at work which tend to opposite results. We have seen that abundant food supply in the conditions of embryonic or prenatal life tends to swift development and developmental abbreviation. The newborn animal is soon fitted, under these conditions, for independent life on a comparatively high level of competition. This shortness of the embryonic period seems to be in direct relation to the shortness or entire absence of the postnatal infancy period. Being thus fitted to take care of himself by advanced uterine development, he does not need after birth the artificial care, protection, etc., of other infants.

On the other hand, where we find a long postnatal infancy period, as in the case of the child, we find also a long antecedent embryo period, in spite of the abundant food supply afforded by the placental method of uterine nourishment.

The difference in the two cases seems to find some explanation when we look at the nature of the mental endowment secured in each case respectively. In the former case — that of swift intra-uterine preparation for immediate, independent life — the goal is refined and varied instinct, a matter of organic structure secured by earlier phylogenetic development: so the pathway of progress is already well trodden and the young organism has a straight road to grow along, marked out by its hereditary impulse. So the stretch to maturity is made rapidly.

In the case, however, of long infancy, both before and after birth, the mental gifts to be secured are of a kind not already crystallized in instinct. The hereditary impulses require a long ontogenetic evolution in each individual. So in spite of all the favourable conditions of abundant food, freedom from disturbing influences, etc., the creature must have both one and the other period at its longest.

The psychological considerations — which I am careful to keep to, not making any claim to biological expertness — would seem to favour some such formulation as the following: the extra-uterine infancy period is to the intra-uterine embryonic period, the conditions being equally favourable, as the amount of possible ontogenetic development is to the amount of phylogenetic development, in the entire working out of the creature's hereditary impulse. For although with creatures of instinct, which represent much phylogeny, the sum of the two periods is short, still the prenatal infancy period is relatively long, while with creatures of intelligence, which represent much ontogeny, although their whole period is long, yet the prenatal infancy period is relatively short.[1]

Furthermore, a great class of mechanical influences, such as external strain and stress, accidents, sudden changes in environment, cause modifications of the physiological conditions, and so also modifications of the stages of growth during the whole infancy period. Biologists recognize the need of restricting their expectations of recapitulation to circumstances in which the physiological conditions have been normal.

The great cause, however, of departures from the series demanded by the theory of recapitulation in a given case is that which is known in general biology technically as 'fortuitous' or 'spontaneous variation.' The law upon the basis of which natural selection gets application in the preservation of adult organisms — the law of supply, by which a great variety of forms is secured to select from — this law applies none the less to immature organisms. Not only do the

[1] That is, both the time ratios and the development ratios are large or small together.

fittest adults survive, but also the fittest embryos develop. And it is only a further application of the same truth — an application recently put in evidence by Weismann (*Romanes Lecture*, Oxford, 1894), under the term 'Intra-Selection' — that single organs of one and the same creature are subject to such selection.[1] It is easy then to see that the actual course of development of an organism along the line of stages marked out by the earlier race development might be disturbed at any point by the operation of natural selection. For under new conditions an embryo which *departs* in some way from the series demanded by recapitulation may by that very fact be fitted to survive, and so be seized upon by natural selection.[2] Sedgwick maintains also that variations found in adult forms are also reflected in the embryo. He says in the paper referred to in the last note (p. 41): "Variations do not merely affect the non-early period of life where they are of immediate functional importance to the animal, but, on the contrary, they are inherent in the germ and affect more or less profoundly the whole of development."

Coming back to mental development, we should expect to find a similar state of things: the recapitulation of mental stages in the history of the child should show similar breaks. Abundant 'food supply' in the shape of lessons, rich sugges-

[1] Cf. the theory of motor adaptation developed below (Chap. VII.).

[2] This influence of 'variation' does not seem to have had sufficient emphasis by embryologists; but see the illustrations of it given by Marshall, who, nevertheless, rather leaves it to be assumed than definitely states it. The recent paper by Sedgwick, *Quarterly Journal of Microscopic Science* (April, 1894), endeavours, however, to reconstruct the theory of recapitulation in view of the facts of variation. He finds that only those stages of ancestral form are preserved in embryos which represent conditions of larval existence in the ancestral line, the point being that the independent life of larvæ have required the full development of organs for actual functions and so secured their preservation in the later series of embryonic changes, the change from larval to embryonic development being due to variation.

tions in its social and educational life, urging forward in tasks of mind, etc., should give precocious mental development in the sense of early maturity of mind. The stages normally prescribed for natural growth may thus be abbreviated. The same effect is produced also by accidents of environment. Newsboys and street gamins become sharp and mentally agile to a phenomenal degree from their method of life, while boys reared in the artificial seclusion and solitude of the single son, educated by a tutor in his father's house, show the contrary character.

The fact of variation, however, should here, as on the biological side, have supreme emphasis. No two children are alike. This is a commonplace; but its true meaning is not a commonplace. Its meaning is not limited to the fact that the child A has a different temperament, different tastes, different memory type, etc., from the child B. It means further that this difference is the only means to human progress, — the only supply of material for the selection of the fittest under the action of a progressive social environment.

I do not care to enlarge here upon the extraordinary[1] pedagogical aspects of this theme, though they are well worth attention. I note it here as a fact important in the theory of mental development. If it be a fact, then all infant observations should be read in the light of it. No child's deeds should be given universal value without a critical examination, before which even the most competent psychologist might well quail. For how do we know that this child has not had artificial rearing so far in its life, how know that he has not experienced accidents of environment which produce those 'developmental conveniences' of mental behaviour which psychologists may recognize as artificial short-cuts from one stage of growth to another; how know

[1] See the relative chapters in the writer's *Story of the Mind.*

that he does but show anachronisms of development forced upon him by malformation of brain, body, or limb? Or is he not himself in some important respect — as to filial instinct, premature sexuality, unusually strong or early thrill of nervous emotion, etc. — a variation, for life or for speedy death? We do not know.

If the morphologist, whose specimens are laid out on glass and bottled in jars, is confused by the perpetual anomalies of recapitulation, which make it necessary for him to arm himself with all the cautions formulated by Balfour, Marshall, Adam Sedgwick,[1] and others; then where is the morphologist of mind, whose specimens are hidden behind all the screens of social convention, maternal pride and tenderness, and all the homely realities of ignorant nursery customs? All he can get is an occasional snap-shot at a baby. And, alas, this is more than most psychologists seem to want!

We are obliged, therefore, to modify even further the principle which seemed safe in our earlier paragraph, *i.e.* that the order of an infant's stages of development might be considered constant. It is only true if we know that the 'stage' is really a universal and regular stage. To be such it must lie between two other 'stages' just as universal and regular. With this caution we may use the rule with two very different degrees of value, according as we are dealing with the ontogeny of man or with his phylogeny, — with what a human mind goes through from cradle to grave on one hand, and with what, on the other hand, we may take from this development, as representing the race history of man, either the history of the species or the wider reach of animal race history.

For it is clear that the stages of human life history may be built up from a wide series of observations of different chil-

[1] In *Quarterly Journal of Microscopic Science*, April, 1894.

dren under varied conditions. So the embryologists establish the ontogeny of a species with great exactness and nicety of observation. In this way the widest reports of single observers of children get their value — a value for science, and especially for education.

But such a science as comparative mental morphology — and even worse, that of mental embryology — is at present a chimera. How can we say anything about recapitulation when we know so little about mental ontogeny and less, perhaps, about comparative mental physiology?[1] In popular phrase, that is: how can we compare the development of the infant with that of the animal series, when we know neither how the child develops nor what is actually taking place in his consciousness, in any great detail, at any stage to which he may have developed?

[1] As treated in 'Individual' and 'Class' Psychology.

CHAPTER II

A New Method of Child Study

§ 1. *Critical*

The current discussions of the more elementary mental processes show that we lack clearness in our conceptions of the earlier stages of mental life. This is evident enough to call out frequent appeals for 'scientific' child study. The word 'scientific' is all right, as far as it goes; but as soon as we come to ask what constitutes scientific child study, and why it is that we have so little of it, we find no clear answer; and we go on as before, accepting the same anecdotes of fond mothers and repeating the observations of Egger and Max Müller.[1]

Now there are only two ways of studying a child, as of studying any other object — observation and experiment. But who can observe, and who can experiment? Who can look through a telescope and 'observe' a new satellite? Only a skilful astronomer. Who can hear a patient's hesitating speech and 'observe' aphasia? Only a neurologist. Observation means the acutest exercise of the discriminating faculty of the scientific specialist. And yet many of the observations which we have in this field were made by the average mother, who knows less about the human body than she does about the moon or a wild flower, or by the average

[1] See, for example, the uncriticised anecdotes given in Sully's *Studies in Childhood*.

father, who sees his child for an hour a day, when the boy is dressed up, and who has never slept in the same room with him in his life; by people who have never heard the distinction between reflex and voluntary action, or that between nervous adaptation and conscious selection. Only the psychologist can 'observe' the child, and he must be so saturated with his information and his observations that the conduct of the child becomes instinct with meaning for the theories of mind and body.

It is evident, however, that all faithful recording is of importance, and that this may be done by all those who can be thoroughly objective and unprejudiced in the presence of children. I believe that many parents can do this with very great accuracy; but there remains still the uncertainty, when such records are taken up for interpretation, as to whether the parent or nurse, in a particular case, *has been* free from the influences of affection, pride, jealousy, etc. On the whole, judging from the records in this branch of psychology, the science would better wait till its competent workers realize their opportunities and seriously study the children for themselves.

And as for 'experiment,' greater still is the need. Many a thing a child is said to do, a little judicious experimenting — a little arrangement of the essential requirements of the act in question — shows it is altogether incapable of doing. But to do this we must have our theories, and have our critical moulds arranged beforehand. That most vicious and Philistine attempt in some quarters to put science in the strait-jacket of barren observation, to draw the life-blood of all science — speculative advance into the meaning of things — this ultra-positivistic cry has come here as everywhere else, and put a ban upon theory. On the contrary, give us theories, theories, always theories! Let every man who has a theory pronounce his theory! This is just the difference between the average mother and the good psychologist — she has no theories, he has; he has no interests, she has. She may bring up a family of a dozen and not be able to make a single trustworthy observation; he may be able, from one sound of one yearling, to confirm theories of the neurologist and educator, which are momentous for the future training and welfare of the child.

In the matter of experimenting with children, therefore, our theories must guide our work — guide it into channels which are safe for the growth of the child, stimulating to his powers, definite and enlightening in the outcome. All this was largely lacking, until recently, both in 'child psychology' and in applied pedagogy. The implications of physiological and mental are so close in infancy, the mere animal can do so much to ape reason, and the rational is so helpless under the leading of instinct, impulse, and external necessity, that the task is excessively difficult — to say nothing of the extreme delicacy and tenderness of the budding tendrils of the mind. Experiment? Every time we send a child out of the home to the school, we subject him to experiment of the most serious and alarming kind. He goes to a teacher who may perchance be not only not wise unto the child's salvation, but on the contrary a machine for administering a single experiment to an infinite variety of children. It is highly probable that two in every three children are more or less damaged or hindered in their mental and moral development in the school; but I am not at all sure that they would fare any better if they stayed at home! The children are experimented with so much and so unwisely, in any case, that it is possible that a little intentional experiment, guided by real insight and psychological information, would do them good.

With this preamble, I wish to call attention to a possible method of experimenting with children.[1] In endeavoring to bring questions like the degree of memory, recognition, association, etc., present in an infant, to a practical test, considerable embarrassment has always been experienced in construing the child's responses safely. Of course the only way a child's mind can be studied is through its expression — facial, lingual, vocal, muscular; and the first question, *i.e.* What did the infant do? must be followed by a second, *i.e.* What did his doing that mean? And the second question is, as I have said, the harder question, and the one which requires more knowledge and insight. It is evident, on the surface, that the farther away we get in the child's life from simple inherited or reflex responses, the more complicated do the responsive processes become, and the greater becomes the difficulty of analyzing them, and arriving at a true picture of the real mental condition which lies back of them.

To illustrate this confusion, I may cite about the one problem which psychologists have attempted to solve by experiments on children: the determination of the order of rise of the child's perceptions of the different qualities of colour. Preyer starts by showing a child, among other methods, various colours and requiring the child to name them, the results being expressed in percentages of true answers to the whole number. Now this experiment involves no less than four different questions, and the results give absolutely no clue to their analysis. It involves: 1. The child's distinguishing of different colours simultaneously displayed before it, *i.e.* the complete development of the child's colour sensation apparatus; 2. The child's ability to recog-

[1] My first discussion of it was in *Science*, New York, April 21, 1893. The work of Warner, *The Development of Mental Faculty*, also proceeds upon the study of movement.

nize or identify a colour after having seen it once; 3. An association between the child's colour-seeing and word hearing and speaking memories, by which the name is brought up; 4. Equally ready facility in the pronunciation of the various colour names which the child recognizes: and there is the further embarrassment, that any such process which involves association, is as varied as the lives of children. The single fact that speech is acquired long after objects and some colours are distinguished, shows that such results are worthless as far as the problem of colour perception is concerned.

That the fourth element pointed out above is a real source of confusion is shown by the fact that children recognize many words which they cannot pronounce readily. This represents the second phase in the development of this experimental problem. Another method used by Preyer and Binet avoids this difficulty. The experimenter varied the conditions by naming a colour and then requiring the child to pick out the corresponding colour. This gave results different from those of the first method. For example, Preyer's child identified yellow better than any other colour, a result which no one has confirmed; it is negatived by the results of Garbini (*Arch. per l'Anthrop. e l'Etnol.*, XXIV., 1894, Nos. 1, 2).

The further objection that colours might be distinguished before the word-association is established at all, or that colour-words might be interchanged or confused by the child,[1] is also seen by Binet,[2] and his attempt to eliminate that source of error constitutes what we may call the third stage in the

[1] A good instance of such confusion, between red and blue, and its correct interpretation, is given by Miss Shinn, *Notes on the Development of a Child*, Part I., pp. 38 and 50.

[2] Professor Preyer later wrote me, that he also saw this in 1882; but his experiments appear of doubtful success (see *Mind of the Child*, English translation, Pt. I., pp. 11, 15, 19).

statement of the problem. He adopts the *méthode de reconnaissance* as preferable to the *méthode d'appellation.* This consisted, in his experiments, in showing to a child a coloured counter, and then asking the child to pick out the same colour from a number of different coloured counters.

This reduces the question to the second of the four I have named above. It is the usual method of testing for colour-blindness. It answers very well for colour-blindness; for what we really want to learn in the case of a sailor or a signalman is whether he can recognize a determined colour when it is repeated; that is, does he know green or red to be the same as his former experience of green or red? But it is evident that there is still a more fundamental question in the matter — the real question of colour perception. It is quite possible a child might not recognize an isolated colour quality when he could really very well distinguish colour qualities side by side. It is the question just now coming to the front, the question of absolute *vs.* relative recognition, or immediate *vs.* mediate recognition.[1] The last question is this: When does the child get the different colour sensations (not recognitions), and in what order?

A further point of criticism of Binet's results serves to illustrate my argument. Binet rules out the influence of the word memories which embarrassed Preyer's results, by his *méthode de reconnaissance.* The child recognizes again the colour just seen. Now those who have followed the course of recent discussions of recognition will remember that the mediation of word-associations is not ruled out in these cases in children of three to five years old or even younger. Lehmann finds coloured wools are recognized when the colours are those whose names are known (*Benennungsassociation*),

[1] See the discussion of the question of tone recognition, below, Chap. XIV., § 3.

and that shades which have not peculiar names, or whose names are not known, are not recognized. Others have held that an unobserved or unintelligible element — a *Nebenvorstellung* — may serve as the link of recognition without rising again to clear consciousness a second time. It is, of course, useless, if these results be trustworthy, to attempt to get recognitions clear of word memories after colour names have once been learned by the child. It would seem that the question ought to be taken up with younger children. Binet's experiments were in the interval between the child's thirty-second and fortieth months. It is perhaps a confirmation of Lehmann's position, that the colours least recognized in Binet's list are shades whose names are less familiar to children; his list, in order of certainty of recognition, is red, blue, green, rose, maroon, violet, and yellow, by the *méthode d'appellation;* and, by both methods together, red, blue, orange, maroon, rose, violet, green, white, and yellow.[1]

§ 2. *Expository*

This colour question may suffice to make clear the essentials of a true experimental method. Only when we catch the motor response, or a direct reflex, in its simplicity, is it a true index of the sensory stimulus in its simplicity. I have accordingly attempted to reach a method of child study of such a character as to yield a series of experiments whose results would be in terms of the most fundamental motor reactions of the infant, which could be easily and pleasantly conducted, and which would be of wide application. The child's hand movements are, I think, the most nearly ideal

[1] Calculated from Binet's detailed results (*Revue Philosophique*, 1890, II., 582 ff.) by Mr. F. Tracy; see his book, *The Psychology of Childhood*, p. 14, and cf. the results of my own experiments below, Chap. IV., § 1.

in this respect. The hand reflects the first stimulations, the most stimulations, and, becoming the most mobile and executive organ of volition, attains the most varied and interesting offices of utility. We have spontaneous arm and hand movements, reflex movements, reaching-out movements, grasping movements, imitative movements, manipulating movements, and voluntary efforts — all these, in order, reflecting the development of the mind. The organs of speech are only later brought into use, and their use for speech involves an already high development of mind, hence the error in many results. It has accordingly seemed to me worth while to find whether a child's reaching movements would reflect with any degree of regularity the modifications of its sensibility,[1] and, if so, how far this could be made a method of experimenting with young children.[2]

I may adduce one or two considerations which tend to show that some such 'dynamogenic' method is theoretically valid. There are some results already recognized in the psychology of sense and movement which lend confirmation to this idea. The facts that the most motile organs have acutest sensibility, notably the hand and fingers; that certain marked types of action, such as imitation, arise early in connection with the hand; that the central organic preparation for volition is secured first in the arrangements for hand movements,[3] — all these facts indicate that the hand

[1] Illustrating 'dynamogenesis,' the general principle that "every stimulus has motor force" (see my *Handbook of Psychol., Feeling and Will*, pp. 28, 281).

[2] The suggestion of Mrs. Ladd Franklin (*The Psychological Review*, I., 1894, p. 202) is quite in accord with this requirement, *i.e.* that Sach's discovery of reflex changes in the width of the pupil when certain colours are looked at might be used to test the colour sensations of very young children.

[3] Soltmann; cf. the chapter below on the 'Origin of Volition,' especially pp. 421, 424.

movements are the best index of general and special sensibility in the infant. Féré maintains that sensory stimulations of all kinds increase the maximum hand pressure. Colours seen have regular, and each its peculiar, effect upon movement. Tones have similar influence. The ticking of a watch is more clearly perceived if movements are made at the same time. Further, the reaction-time of hand movements is shorter if the stimulus (sound, etc.) be more intense. There is an enlargement of the hand, through increased blood pressure, when a loud sound is heard. The fact of muscle-reading, and its experimental demonstration by Gley and Jastrow, together with the series of facts shown by recent experiments in so-called 'unconscious movements' by diseased patients,[1] — these, and a variety of other facts upon which the law of 'dynamogenesis' rests, seem to afford justification for the view that the infant's hand movements in reaching and grasping are the best index of the kind and intensity of its sensory experiences. Magendie[2] long ago suggested measuring changes in sensibility by the corresponding changes in blood pressure.

Further, it is not necessary to embarrass ourselves with the question whether the hand movements are voluntary or not. However we may differ as to the circumstances of the rise of volition, it is still true that after its rise the child's reactions are for a long time quite under the lead of its sensory life. It lives so fully in the immediate present and so closely in touch with its environment, that the influences which lead to movement can be detected with great regularity. In this case the sensations which are stimuli to movement become what we may also call 'effort stimuli,' and the child's efforts with his hands become indications of the relative degree of discrimination, attractive-

[1] Binet, Janet. [2] Féré, *Sensation et Mouvement*, p. 56.

ness, etc., of the different sensations which call the efforts out.

Suppose we hang up a piece of meat over Carlo's head and tell him to jump for it. His first jump falls short of the meat. He jumps again and clears a greater distance. Why does he jump farther the second time? Not because he argues that a harder jump is necessary to secure the meat; but because by the first jump he got more smell, blood colour, and appetite stimulus from the meat. Now suppose it to be a red rag instead of meat, and Carlo refuse to jump a second time. This is not because he concludes the rag would choke him, but because he gets a kind of sensation which takes away what appetite stimulus he had before. The thing is a thing of sensational dynamogeny of 'suggestion,' and the child's state of mind up to his twenty-fourth month, more or less, is just about the same.

The following questions, I think, might be taken up by some such method as this: —

1. The presence of different colour sensations as shown by the number and persistence of the child's efforts to grasp the colour: the problem of colour *perception.*

2. The relative attractiveness of different colours measured in the same way: the problems of colour *preference* and *distinction.*

3. The relative attractiveness of different colour combinations.

4. The relative exactness of distance estimation as shown by the child's efforts to reach over distances for objects.

5. The relative attractiveness of different visual outlines (stars, circles, etc.) cut in the same attractive colour, etc.

6. The relative use of right, left, and both hands.

7. The rise of imitative movements.

8. The rise of voluntary movements.

9. The presence and character of 'accompanying movements' at different stages of motor development.

10. The strength of desire and voluntary inhibition as shown in the relative persistence of movements of grasping.

11. The relative strength of disparate sensations at different periods of child life, as shown by their comparative expression in movement.

12. The inhibiting influence of elementary associations, especially pains, punishments, etc.

I am quite aware of the meagreness of this list; but one has only to remember the fact that there is no such thing yet as a psycho-physics of the active life, that this side of psychology is almost *terra incognita* to the experimentalist.[1] If the method prove reliable in one-half of these questions, then so much gain. I have applied it to some of them in a more or less incomplete way, in the case of my two children, H. and E., both girls, with the results recorded in subsequent pages of this book. In each case below I take occasion to say to what extent the results are of real, or only of methodological, value.

§ 3. *Formula of the Dynamogenic Method*

When this method is reduced to its lowest terms, as applied to children old enough to reach out for objects which they

[1] I see no reason that a method could not be devised for testing the motive influences of presentations of a neutral associational character in terms of the time elapsed since their experience. I have announced elsewhere (*Proceedings of Congress for Exper. Psychology*, London, 1892) the first results of a research conducted upon adults by such a method (see the experiments reported below, Chap. XIII., § 4). Professor Münsterberg has recently suggested a method of studying the influence of stimulations upon eye movements, attention, etc., which is also dynamogenic and proceeds upon somewhat the same presuppositions (*The Psychological Review*, I., pp. 441 ff., September, 1894).

see, two variable quantities are always involved. The reactions will vary in some way with the distance of the object exposed, and also in some way with the kind of stimulus. For example, a child of perhaps eight months of age reaches after an orange, when it is eleven inches in front of him, with great regularity; but very irregularly, or possibly not at all, when it is fourteen inches away. Again, he reaches for a colour, red, when perhaps he would not for a colourless object.

If we take the simplest cases — cases in which observation shows the responses of the child to be regular, the conditions of quiet, comfortable position, interest, etc., being throughout normal and undisturbed — we may consider these two things, quality and distance, as the only important variables. By quality is meant the so-called sensational character of the stimulating object. If, then, we further inquire into the drawing-out influence of various stimulations, it is evident that it will vary with the quality (q), and, in some inverse ratio, with the distance (d). In other words, naming the calling-out or dynamogenic influence of a stimulus D, we have the equation,

$$D = \kappa \cdot \frac{q}{d},$$

in which κ is the sign of proportion.

I state this formula, not to be mathematical, but simply, by ringing the changes possible through substitution of values, to illustrate the applications of the method and the limits of the general principle of reaction. If q be kept constant, experiments will determine the law by which the influence of d changes. Again, experiments at different ages would show the effect on d of experience in associating visual distance with muscular distance. Again, keeping d

constant, experiments would show the value of various sense qualities, the q values.

An interesting point emerges when we inquire the effect of zero and infinity values. If the child, for example, always reaches for a colour at nine inches, this would be practically the case of $d = 0$. For, as a matter of fact, distance then has no influence; the whole possible variation in D in successive experiments with different q's is due to the q-values themselves. It is asked at once why the influence of d is not equally ruled out in any series of experiments in which d is kept constant, say at twelve inches. The answer is: because in each such series the influence of d changes from the fact of practice, habit, and slight fatigue. If the child reaches for a blue-q at twelve inches, and just gets it, he may then reach for a green-q with greater avidity at twelve inches than he would otherwise have reached for the same green-q at nine inches. So psychology interferes with mathematics. The value for $d = 0$, at which we have the purest influence of q, is not the least distance possible, but the child's normal reaching distance.

Again, if the child just refrains from reaching for a q at fourteen inches, this means practically that $d = \infty$; that is, the influence of d is so all-important that it shuts out all relative q-influences. The distance inhibits movement altogether. But just here another psychological factor interferes with the mathematics; in some cases the inhibition of d does not work, and the child oversteps all its experience in violent straining and cries. These two so-called psychological 'interferences' are referred to again later on, the latter being, I think, the main external channel of the rise of right- or left-handedness.[1]

These qualifications make it evident that this form of

[1] See below, Chap. IV.

mathematical statement makes only — what most appeals to mathematics in psychology are — an artificial show of exactness. This method, like all other psychological methods, must be used with a thousand cautions and as many failures; and the last condition of such experiments, as the first condition of all work with children, is sympathetic insight into their mental movements. Only such sympathy and insight can cope with the subtle responses which a wide-awake child makes to the most trifling variations in our treatment of him.

I shall now give further facts and experiments illustrating the regularity of the child's reactions, and so put in evidence the general principle of 'dynamogenesis,' upon which all motor development, both in the child and in the race, must ultimately rest.

PART I

EXPERIMENTAL FOUNDATION

CHAPTER III

Distance and Colour Perception by Infants

§ 1. *Experimental*

The method called 'dynamogenic' has been explained in earlier pages. The application of it to particular questions now demands attention, as far as the present writer has attempted to apply it.

It is evident, as was said before in speaking of the infant's responses in reaching for objects, that in any particular case the element of distance is a variable quantity to be considered with the influence of the particular stimulus in question. In investigating the infant's colour sensations, therefore, we have the formula $D=\frac{c}{d}$, in which c denotes colour, d, distance, and D, strength of dynamogeny, as already explained.

I undertook at the beginning of my child H.'s ninth month to experiment with her with a view to arriving at the exact state of her colour perception, employing this new method. The arrangements consisted in this instance in giving the infant a comfortable sitting posture, kept constant by a band passing around her chest and fastened securely to the back of her chair. Her arms were left bare and quite free in their movements. Pieces of paper of different colours were successively exposed, at varying distances, front, right, and left. This was regulated by a framework, consisting of a horizontal rod graded in inches, projecting from the back of the chair at a level with her shoulder and parallel with her arm when extended straight forward, and carrying on it another rod, also graded in inches, at right angles to the first. This second rod was thus a horizontal line directly in front of the child, parallel with a line connecting her two shoulders, and so equally distant for both hands. This second rod was made to slide upon the first, so as to be adjusted at any desirable distance from the child. On this second rod the colours, etc., were placed in succession, the object being to excite the child to reach for the colour.

So far from being distasteful to the infant, I found that, with pleasant suggestions thrown about the experiments, the whole procedure gave her very evident gratification, and the affair became one of her pleasant daily occupations. After each sitting she was given a reward of some kind.

The accompanying tables give the results, both for colour and distance, of 217 experiments. Of these 111 were with five colours and 106 with ordinary newspaper (chosen as a relatively neutral object, which would have no colour value and no association to the infant). In the tables R stands for 'refusal' to reach out for the object, A for 'acceptance' with effort, N for the entire number of experiments with each colour respectively, and n for the entire number with all the colours at each distance respectively. So $\frac{A}{N}$ = the proportion of acceptances or efforts for any colour, and $\frac{R}{n}$ = the proportion of refusals for each distance.

TABLE I

Distance, Inches	9	10	11	12	13	14	15	Totals.	Ratio $\frac{A}{N}$.
	R. A.	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A. N.*	
Blue	0–1	0–4	0–5	1–3	2–4	1–5	3–1	7–23–30	.766
Red	0–1	0–3	2–2	1–4	1–7	1–7	5–1	10–25–35	.714
White	0–0	0–0	0–0	0–1	0–5	1–1	3–0	4– 7–11	.636
Green	0–0	0–1	0–1	2–1	1–4	1–2	2–0	6– 9–15	.60
Brown	0–1	0–2	2–1	3–2	0–3	3–1	2–0	10–10–20	.50
Totals	0–3	0–10	4–9	7–11	4–23	7–16	15–2	37–74–111	.66
Ratio $\frac{R}{n}$	0	0	.30	.39	.15	.31	.88	Total .33	

TABLE II

Distance, Inches	9	10	11	12	13	14	15	Totals.	Ratio $\frac{A}{N}$.
	R. A.	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A.*	*R. A. N.*	
News-paper				0–17	0–28	1–33	25–2	26– 80–106	.754
Colour	0–3	0–10	4–9	7–11	4–23	7–16	15–2	37– 74–111	.666
Totals	0–3	0–10	4–9	7–28	4–51	8–49	40–4	63–154–217	.71
Ratio $\frac{R}{n}$			.31	.20	.07	.14	.91	Total .29	

From these tables we might be able if the experiments were of sufficient number and all proper precautions had been taken — on which points the next paragraph may be read — to conclude important results for the perception of colour and distance. The following inferences, indeed, seem to be safely drawn.

Colour. — The results are evident in the tables (I. and II.), especially the columns marked Ratio $\frac{A}{N}$ and Ratio $\frac{R}{n}$. The colours range themselves in an order of attractiveness, *i.e.* blue, red, white, green, and brown. Disregarding white, the difference between blue and red is very slight compared to that between any other two. This confirms Binet as against Preyer, who puts blue last, and also fails to confirm Preyer in putting brown before red and green. Brown to my child — as tested in this way — seemed to be about as neutral as could well be. A similar distaste for brown was noticed in the child observed by Miss Shinn.[1] White, on the other hand, was more attractive than green and slightly more so than red. I am sorry that my list does not include yellow. The newspaper was, at reaching distances up to 14 inches, as attractive as any of the colours, and even more so; but this is probably due to the fact that the newspaper experiments came after a good deal of practice in reaching after colours, and a more exact association between the stimulus and its distance; an influence which I have remarked upon in the general discussion, above,[1] of the formula for the method. At 15 inches and over, accordingly, the newspaper was refused in more than 93 per cent of the cases, while blue was refused at that distance in only 75 per cent, and red in 83 per cent.

Distance.[2] — In regard to the question of distance, the child persistently refused to reach for anything put 16 inches or more away from her. At 15 inches she refused 91 per

[1] *Loc. cit.*, p. 47. [2] See also the remarks in Chap. IV., § 2.

cent of all the cases, 90 per cent of the colour cases, and, as I have said, 93 per cent of the newspaper cases. At nearer distances we find the remarkable uniformity with which the *safe-distance* association works at this early age. At 14 inches only 14 per cent of all the cases were refused, and at 13 inches only about 7 per cent. The fact that there was a larger percentage of refusals at 10 and 12 inches than at 13 and 14 inches, is seen from the table (I.) to be due to the influence of the brown, which was refused consistently when more than 10 inches away. The fact that there were no refusals to reach for anything exposed within reaching distance (10 inches) — other attractive objects being kept away — shows two things: (1) the very fine estimation visually of the distance represented by the arm length, thus emphasizing the element of muscular sensations of arm movement in the perception of distance generally; and (2) the great uniformity at this age of the phenomenon of 'sensori-motor suggestion'[1] upon which this method of child study is based. In respect to the first point, it will be remembered that the child does not begin to reach for anything that it sees until the fourth or sixth week; so it is evident at what a remarkably fast rate this association is formed between arm movements and those obscure factors of size, perspective, light and shade, etc., which signify distance to the eye; in such a way that the inhibition of arm movement by sensations from the other sense, vision, is secured so early.

In regard to the relative use of the two hands in these and other experiments, — this is a topic to which I may devote the next brief chapter.[2]

[1] See below, Chap. VI., § 3.

[2] Many of the results of these experiments have been confirmed by Mr. R. E. Marsden (see his papers in *The Psychological Review*, 1903, pp. 37, 297), using the same method.

§ 2. *Critical*

It is in place to recall the criticisms already offered [1] upon the colour experiments of Preyer and Binet. I think the method thus applied successfully obviates many of the difficulties of earlier methods. There are certain other requirements of proper procedure, however, which, so far as I am aware, have never been duly weighed by those who have experimented with young children.

In the first place, fatigue is a matter of considerable importance, not only on this method but on any other. Again, the child is peculiarly susceptible to the appeals of change, novelty, chance, or happy suggestion; and often the failure to respond to a stimulus is due to distraction or to discomfort rather than to lack of intrinsic interesting quality. In respect to fatigue, I would say that the first signs of restlessness, or arbitrary loss of interest, in a series of stimulations, is sufficient warning, and all attempts at further experimenting should cease. Often the child is in a state of indisposition, of trifling nervous irritability, etc.; this should be detected beforehand and then nothing should be undertaken. No series longer than three trials should be attempted without changing the child's position, resting its attention with a song or a game, etc., and thus leading it fresh to its 'task' again. Further, no single stimulus, as a colour, should be twice repeated without a change to some other; since the child's eagerness or alertness is somewhat satisfied by the first effort and a new thing is necessary to bring him out to full exercise again. Further, after each effort or two the child should be given the object reached for to hold or play with for a moment; otherwise he grows to apprehend that the whole affair is a

[1] Above, Chap. II., § 1.

case of Tantalus. In all these matters, very much depends upon the knowledge and care of the experimenter, and his ability to keep the child in a normal condition of pleasurable muscular exercise throughout.[1]

Coming to colour experiments, several requirements would appear to be necessary for exact results. Should not the colours chosen be equal in purity, intensity, lustre, illumination, etc.? In reference to these qualitative differences, — those which are really important in order to keep our symbol constant as respects all but the qualitative colour influence,—I think only that degree of care need be exercised which good comparative judgment provides. Colours of about equal objective intensity, of no gloss, of relatively evident spectral purity, under constant illumination, — this is all that is required; for the variations due to the grosser influences I have mentioned, such as condition of attention, physical unrest, disturbing noises, sights, etc., are of greater influence than any of these more recondite objective variations in the stimulus. Intensity and lustre, however, are certainly important. It is possible, by carefully choosing a room of pretty constant daylight illumination, and setting the experiments at the same hour each day, to secure a regular degree of brightness if the colours themselves are equally bright; and lustre may be ruled out by using coloured wools or blotting-papers. The papers used by myself were coloured blotting-papers, which I selected by their empirical properties as good for the purpose. The omission of yellow is due to the absence, in my neighbourhood, of a yellow paper that satisfied me. I did not care to introduce another element of

[1] It is on account of my extreme care in these points that the number of experiments recorded in the tables in this chapter is so small; as it was, they extended over a period of more than six months. I was then obliged to separate myself from the child, and so the series came to an end.

uncertainty in the way of change of texture or general character as to shape, form, etc., as an altogether different object would have done.

The most valid criticism, therefore, on the tables is that which exposes the small number of experiments; and an examination of the table proves it well taken. It has been suggested to me by a friend[1] that the results at 11, 12, 13, and 14 inches might be taken together for each colour; since the element of distance would not give important variations within these limits. This, it will be seen, however, on calculation, does not alter the order of colour preference, except to lay more emphasis on white.

On the whole, therefore, I attach some little importance[2] to the experiments apart from their illustrative value and their possible stimulating effect upon others who may care to extend them. Their main purpose in the progress and plan of this book is seen in their witness to the regularity of operation of the principle of suggestion or dynamogenesis.

[1] Mrs. C. Ladd Franklin, who wrote to me kindly about the papers as originally published in *Science*.

[2] For example, Preyer's contention (repeated in his 4th ed., p. 14), that the child has no colour 'distinctions' in his first two years, is disproved by these results, which indicate different colour perceptions in and after the ninth month.

CHAPTER IV

The Origin of Right-handedness

§ 1. *Experimental*

The question 'Why are we right- or left-handed?' has exercised the speculative ingenuity of many men. It has come to the front anew in recent years, in view of the advances made in the general physiology of the nervous system; and certainly we are now in a better position to set the problem intelligently and to hope for its solution. Hitherto the actual conditions of the rise of 'dextrality' in young children — as the general fact of uneven-handedness may be called — have not been closely observed. It was to gain light, therefore, upon the facts themselves that the experiments described in the following pages were carried out.

My child H. was placed in a comfortable sitting posture, the arms left bare and free in their movement, and allowed to reach for objects placed before her in positions exactly determined and recorded by the simple arrangement of sliding rods already described. The experiments took place at the same hour daily, for a period extending from her fourth to her tenth month. These experiments were planned with very great care and with especial view to the testing of several hypotheses which, although superficial to those who have studied physiology, yet constantly recur in publications on this subject.[1] Among these theories certain may be men-

[1] Cf. Vierordt's remarks, *Physiologie des Kindesalters*, pp. 428, 429. For a detailed statement of theories on this topic, see Chap. X. of the very learned

tioned with regard to which my experiments were conclusive. It has frequently been held that a child's right-handedness arises from the nurse's or mother's constant method of carrying it; the child's hand which is left free being more exercised, and so becoming stronger. This theory is ambiguous as regards both mother and child. The mother, if right-handed, would carry the child on the left arm, in order to work with the right arm. This I find an invariable tendency with myself and with nurses and mothers whom I have observed. But this would leave the child's left arm free, and so a right-handed mother would be found with a left-handed child. Again, if the mother or nurse be left-handed, the child would tend to be right-handed. Or if, as is the case in civilized countries, nurses largely replace the mothers, it would be necessary that most of the nurses be left-handed in order to make most of the children right-handed. Now none of these deductions are true. Further, the child, as a matter of fact, holds on with both hands, however it is itself held.

Another theory maintains that the development of right-handedness is due to differences in weight of the two lateral halves of the body; this tends to bring more strain on one side than the other, and so to give more exercise, and so more development, to that side. This evidently assumes that children are not right- or left-handed before they learn to stand. This my results given below show to be false. Again, we are told that infants get right-handed by being placed on one side too much for sleep; this can be shown to have little force also, when the precaution is taken to place the child alternately on its right and left sides for its sleeping periods.

In the case of the child H., certain precautions were care-

monograph on *The Right Hand: Left-handedness,* by my late lamented colleague and friend Sir Daniel Wilson.

fully enforced. She was carried about in arms very little, never walked with when crying or sleepless (a ruinous and needless habit to cultivate in an infant); she was frequently turned over in her sleep; she was not allowed to balance herself on her feet until a later period than that covered by the experiments. Thus the conditions of the rise of the right-handed era were made as simple and uniform as possible.

The experiments included, besides reaching for colours, a great many of reaching for other objects, at longer and shorter distances, and in unsymmetrical directions. The following table (III.) gives some details of the results of the experiments in which simple objects were used, extending over a period of four months, from the fifth to the ninth in her life. The number of experiments at each sitting varied from ten to forty; the position of the child being reversed, as to light from windows, position of observation, etc., after half of each series.

TABLE III

Date.	No. of Series.	No. of Experiments.	Right Hand.	Left Hand.	Both Hands.
1890. February 10th to March 15th	30	744	173	166	405
March 14th to April 14th . .	25	623	134	141	348
April 14th to May 14th . . .	25	546	213	130	203
May 14th to June 19th . . .	16	274	57	131	86
Total	96	2,187	577	568	1042

It is evident from Table III. that no trace of preference for either hand is discernible during this period; indeed the neutrality is as complete as if it had been arranged beforehand, or had followed the throwing of dice.

I then conceived the idea that possibly a severer distance test might affect the result and show a marked preferential response by one hand over the other. I accordingly continued to use a neutral stimulus, but placed it from 12 to 15 inches away from the child. This resulted in very hard straining on her part, with all the signs of physical effort (explosive breathing-sounds resulting from the setting of the larynx, rush of blood to the head, seen in flushing of the face, etc., and flow of urine). Table IV. gives the results; the number in each series was intentionally made very small, from one to twelve, in order to avoid fatigue:—

TABLE IV

Date.	No. of Series.	No. of Trials.	Right Hand.	Left Hand.	Both Hands.
1890. May 26th to June 10th	32	80	74	5	1

The same cases, distributed according to distance, give us Table V.:—

TABLE V

	12 Inches.	13 Inches.	14 Inches.	15 Inches.
Right hand	29	10	33	2
Left hand	5	—	—	—
Both hands	1	—	—	—

A comparison of Tables IV. and V. with Table III. shows a remarkable difference. During the month ending June 15th, the child showed no decided preference for either hand in reaching straight before her within the easy reaching distance of 10 inches, but a slight balance in favour of the left hand; yet she was right-handed to a marked degree during the same period as regards movements which required effort or strain, such as grasping for objects 12 to 15 inches distant. For the greater distances, the left hand was used in only five cases as against seventy-four cases of the use of the right hand; and further, all these five cases were twelve-inch distances, the left hand being used absolutely not at all in the forty-five cases at longer distances.

In order to test this further, I varied the point of exposure of the stimulus to the right or left, aiming thus to attract the hand on one side or the other, and so to determine whether the growth of such a preference was limited to experiences of convenience in reaching to adjacent local objects, etc. The result appears in Table VI.: —

TABLE VI

June 10th to 20th.	12 Inches.	13 Inches.	14 Inches.	15 Inches.	Hand used.	
					Right.	Left.
Deviations from median line —						
2 to 6 inches to left	10 cases	15 cases	4 cases	—	35	—
2 to 6 inches to right . . .	2 "	3 "	1 "	—		
Same conditions with colour stimulus .	—	—	—	—	15	2

This table shows that deviation to the left in front of the body only called out the right hand to greater exertion, while the left hand fell into still greater disuse. This seems to show that dextrality is not derived from the experience of the individual in using either hand predominantly for reaching, grasping, holding, etc., within the easiest range of that hand.

The right hand intruded regularly upon the domain of the left.

Proceeding upon the clue thus obtained, a clue which seems to suggest that the hand preference is influenced by the eye stimulus, I introduced hand observations into a series of experiments which I was making at that time on the same child's perception of the different colours; thinking that the colour stimulus which represented the strongest inducement to the child to reach, might have the same effect in determining the use of the right hand as the increased distance in the experiments already described. This inference is proved to be correct by the results given in Table VII.:—

TABLE VII

Colour stimulus, 10 to 15 inches	Hand	Right.	Left.	Both.	May 23d to June 19th.
	Number of cases .	86	2	—	

It should be added that in all cases in which both hands are said to have been used, each hand was called out with evident independence of the other, both about the same time, and both carried energetically to the goal. In many other cases in which either right or left hand is given in the tables, the other hand also moved, but in a subordinate and aimless way. There was a very marked difference between the use of both hands in some cases, and of one hand followed by, or accompanied by, the other in other cases. It was very rare that the second hand did not thus follow or accompany the first; and this was extremely marked in the violent reaching for which the right hand was mainly used. This movement was almost invariably accompanied by an objectless and fruitless symmetrical movement of the other.

The results of the entire series of experiments on the use of the hands may be stated as follows, mainly in the words in which I reported them summarily some time ago.[1]

1. I found no continued preference for either hand as long as there were no violent muscular exertions made (based on 2187 systematic experiments in cases of free movement of hands near the body: *i.e.* right hand, 577 cases; left hand, 568 cases, — a difference of 9 cases; both hands, 1042 cases; the difference of 9 cases being too slight to have any meaning), the period covered being from the child's sixth to her tenth month inclusive.

2. Under the same conditions, the tendency to use both hands together was about double the tendency to use either (seen from the number of cases of the use of both hands in the statistics given above).

3. A distinct preference for the right hand in violent efforts in reaching became noticeable in the seventh and eighth months. Experiments during the eighth month on this cue gave, in 80 cases: right hand, 74 cases; left hand, 5 cases; both hands, 1 case. This was true in two very distinct classes of cases: first, reaching for objects, neutral as regards colour (newspaper, etc.), at more than the reaching distance; and, second, reaching for bright colours at any distance. Under the stimulus of bright colours, from 86 cases, 84 were right-hand cases and 2 left-hand. Right-handedness had accordingly developed under pressure of muscular effort

[1] *Science*, XVI., Oct. 31, 1890; discussed by James, *Science*, Nov. 8, 1890, by Dr. J. T. O'Connor, *Ibid.*, XVI., 1890, p. 331, and by myself, *Ibid.*, XVI., Nov. 28, 1890. The results are quoted in full in *Nature*, Nov. 13, 1890, and in part in the *Illustrated London News*, Jan. 17, 1891. See discussions of them also in *Zeitsch. für Psychologie*, II., 1891, p. 239; Wilson, *The Right Hand: Left-handedness*, pp. 128–131; *Revue Scientifique*, 1891, II., p. 493; Mazel, *Revue Scientifique*, 1892, I., p. 113. Both writers in the last-named journal cite these experiments wrongly as Wilson's. For later discussions of these and the colour experiments, see the child-study literature generally.

in the sixth and seventh months, and showed itself also under the influence of a strong colour stimulus to the eye.

4. Up to this time the child had not learned to stand or to creep; hence the development of one hand more than the other is not due to differences in weight between the two longitudinal halves of the body. As she had not learned to speak or to utter articulate sounds with much distinctness, we may say also that right- or left-handedness may develop while the motor speech centre is not yet functioning. Further, the use of the right hand is carried over to the left side, showing that habit in reaching does not determine its use.

5. In most cases involving the marked use of one hand in preference to the other, the second or backward hand followed slowly upon the lead of the first, in a way clearly showing symmetrical innervation of accompanying movements by the second hand. This confirms the inference as to such movements drawn from the phenomena of mirror-writing, etc., by Fechner and E. H. Weber.[1]

§ 2. *Theoretical*

I. Some interesting points arise in connection with the interpretation of these facts. If it be true that the order of rise of mental and physiological functions is constant, then for this question the results obtained in the case of one child, if accurate, would hold for others apart from any absolute time determination. We would expect, therefore, that these results would be confirmed by experiments on other children, and this is the only way their correctness can be tested.[2]

[1] I do not find, therefore, that these experiments warrant the negative inference on this question which Münsterberg has drawn from them: *Beiträge zur Exp. Psych.*, Heft IV., p. 197.

[2] Vierordt says concerning such experiments: "Adequate observations are wanting on the grasping movements of the infant's left and right arm — a

If, when tested, they should be found correct, they would be sufficient answer to several of the theories of right-handedness heretofore urged. The phenomenon cannot be due, as I have said, to differences in balance of the two sides of the body, for it arises before the body begins to stand erect. It cannot be due to experience in the use of either hand, since it arises when there is no such difference of experience, and since the hand preferred is used, as a matter of fact, for purposes for which in experience the other would be altogether more convenient.[1] The rise of the phenomenon must be sought, therefore, in more deep-going facts of physiology than such theories supply.

If, on the other hand, heredity be brought to the aid of these 'experience' theories, it is possible to claim that, as structure follows function, experience of function must have been first in race history; and only then would the modification in structure which is now sufficient to produce right-handedness in individual cases have been brought about. On the other hand, if we go lower in the animal scale than man, analogies for the kinds of experience which are urged as reasons for right-handedness are not present; animals do not carry their young, nor pat them to sleep, nor do animals shake hands! It must therefore be shown that animals are right- or left-handed, or that they differ in some marked respect in regard to function, in their nervous make-up, from man. Admitting the need of meeting these requirements;

kind of observation which would be of the first importance for this inquiry," *Physiologie des Kindesalters*, p. 428; and Wilson: "Only a prolonged series of observations, such as those by Professor Baldwin already noted, made at the first stage of life, and based on the voluntary and the unprompted actions of the child, can supply the needful data," *Left-handedness*, p. 209.

[1] An additional point, which I think is true, is that a right-handed child learns to shake hands properly — using the more inconvenient hand across his body — more easily than the left-handed child.

admitting again that we have little evidence that animals are dextral in their functions; admitting also the known results as to the control of the two halves of the muscular system by the opposite brain hemispheres respectively; admitting further that the motor speech function is performed by the hemisphere which controls the stronger side of the body, and is adjacent to the motor arm centre in that hemisphere; and admitting, finally, that the speech function is one in which the animals have little share, — all these admissions lead us at once to the view that there is a fundamental connection between the rise of speech and the rise of right-handedness.[1]

Looking broadly at the methods of nervous and muscular development, and accepting all the results of neurology we are able to gather, we may say that in the differentiation of functions in the animal series certain principles may be recognized: 1. The deep-seated vital functions represent least nervous differentiation, as is seen in the simple organs known as the lower nervous centres. 2. New symmetrical

[1] This much has been before surmised by Mazel, *Revue Scientifique*, 1892, I., p. 113. He makes no attempt, however, to account for the association, except by calling both functions expressive. Mr. F. H. Cushing has sent me a paper on 'Manual Concepts' (*American Anthropologist*, V., 1892, p. 289) in which he gives interesting evidence from philology and race customs among various peoples of the direct influence of hand movements upon spoken and written language. He finds evidence that the Zuñi and Roman numeral sounds are derived from hand words, and their numeral graphic signs are transcribed hand positions. It would be interesting also to inquire how far the right hand is predominant in gesture and sign languages, which precede articulate speech. Cushing points out that the left hand is usually a passive instrument which is manipulated actively by the right. The best report on sign-language is that of Mallery in *Report of the Bureau of Ethnology*, I., 1881, and the best discussion of the phenomenon is by Romanes, *Ment. Evolution in Man*, pp. 104 ff. I have asked Mr. Lester Jones, Fellow of Princeton College, to examine Col. Mallery's detailed reports of the actual signs employed in the sign-languages of the North American Indians, tabulating the cases in which either hand is used alone or predominantly. I give Mr. Jones' results in Appendix B, with some remarks upon their value for our present inquiry.

functions give a differential or twofold organic development, the great instance of which is found in the cerebral hemispheres. 3. New asymmetrical or unilateral functions find their counterpart each in one of three kinds of nervous adaptation: (*a*) co-ordination of the hemispheres in a single function — *i.e.* functions which are crippled if either hemisphere is damaged; (*b*) co-ordination of particular functions in each hemisphere — *i.e.* functions which are not crippled unless both hemispheres are damaged; and (*c*) co-ordination of particular functions in one hemisphere only — *i.e.* functions which are crippled only if one selected hemisphere is damaged. All these kinds of co-ordination exist.

It is easy to see that both speech and right-handed function belong under the last head of the last class — co-ordinations of particular functions in one hemisphere only — and that they belong in the same hemisphere. Why is this? What have they in common?

A very essential kind of hand movements are the so-called 'expressive' movements, meaning those which serve to convey a meaning, or express a state of consciousness. Of course, speech is *par excellence* the function of expression. It is further only a part of the position upon which the psychological theory of expression is based, that all movements are in a sense expressive, and that details of expression and its relative fulness are matters of co-ordination. Now, this co-ordination has attained its ripest and most complex form, apart from speech,[1] in movements of the hand. Upon this view it is easy to hold that right-handedness is a form of expressive differentiation of movement, and that it preceded speech, which is a further and more complex form of differentiation serving the same utility.

The neurological basis upon which this hypothesis rests is

[1] See physiological evidence, below, pp. 400 ff.

adequate, and affords a presumption as to the psychological development as well. The facts which are given in these pages go some way to support the view: 1. Right-handedness arose before speech in the child H. 2. Imitation by the hand of movements seen arises before articulate imitations of sounds heard;[1] this in spite of the fact that hearing, in its development in the child, becomes perfect before sight. 3. Characteristic differences in children in respect to their general mobility of arm and hand, manual skill, and quickness of manipulation, extend also to speech. As compared with my other child, E., the first-born, H., is remarkably agile and motile generally in her temperament; and her speech development was relatively much earlier and more rapid.

It is interesting also to note that musical ability is associated with speech ability — a connection which would be expected when one takes due account of the expressive character and function of music. As far as theories of the rise of musical expression have gone, they unite in finding its beginnings in the rudimentary emotional expressions of the animals. The singing of birds is undoubtedly connected with their mating instincts. Pathological cases also show a marked connection between musical execution and speech, to the extent that, while musical defect almost invariably involves speech defects, the reverse is much less generally true — a fact which confirms the view that music is an earlier form, but still a form, of expressive reaction.

Late observations also show, as far as they are sufficient, that the centre for music expression is also located normally in the left hemisphere for right-handed persons. Oppenheim

[1] See Chap. VI., § 4. It is interesting that of both hand and speech movements the latest to be lost in disease are those involved in the so-called 'mimicry' of movement and in imitative speech.

reports a case[1] of total aphasia with total amusia (lack of musical ability from disease) in which the recovery of speech brought with it musical recovery also. Furthermore, another case of Oppenheim's shows motor aphasia with motor amusia only — *i.e.* the patient could still understand tunes, and, further, could imagine tunes 'in his head,'[2] while he could not sing them. This shows a close connection in locality between motor speech and motor music function, while a slight separateness of the two centres in locality in the left hemisphere explains cases of motor aphasia in which execution is preserved. Further, Frankl-Hochwart declares that no cases are recorded of amusia from lesion in the right hemisphere,[3] and Starr says of a patient of his:[4] "My patient is right-handed, and music does follow speech in being unilaterally located; . . . it is well proved that the musical faculty is one-sided in location." Despite these positive opinions, however, I think more critical cases with autopsy are necessary to make the position quite secure.

The service which speech owes to gesture is emphasized by Romanes in the following words: "Although gesture language is not in my opinion so efficient a means of developing abstract ideation as is spoken language, it must nevertheless have been of much service in assisting the growth of the latter, and . . . in laying the foundation of the whole mental fabric which has been constructed by the faculty of speech. Whether we look to children, to savages, or, in a lesser degree, to idiots, we find that gesture plays an important

[1] *Charité Annalen*, XIII., 1888, p. 286.

[2] Cf. Chap. XIV., below, for further exposition of the mechanism of speech and the music function.

[3] This means that all cases noted have been right-handed. *Deutsche Zeitsch. für Nervenheilkunde*, 1891, I., p. 295, and foot-note.

[4] In a private letter. The case is referred to by Starr in *The Psychological Review*, January, 1894, p. 92.

part in assisting speech; and in all cases where a vocabulary is scanty or imperfect, gesture is sure to be employed as the natural means of supplementing speech. . . . Therefore it is, in my opinion, perfectly certain that its origin and development must have been assisted by gesture. There can be no doubt that the reciprocal influence must have been great in both directions, and that it must have proceeded from gesture to speech in the first instance, and afterwards from speech to gesture."

All this means simply that the general cause to which is due the fact of right-handedness is also the cause, through further differentiation and emphasis in the same local seat, of the development of speech and of musical ability. It now remains to ask: What was or is this cause, and when in the race history series did it begin to operate? There are only two hypotheses of any force — either that of 'experience,' or that of 'spontaneous variation' at some stage in biological development.

It is extremely improbable that dextrality should have arisen among the quadrupeds, or amanous bipeds, for experience was lacking of unilateral stimulation, and a spontaneous variation of this kind would have produced such inconvenience of locomotion and ultimately such asymmetry of form that it would have been weeded out.[1] As an extreme example, fancy a bird become dextral in its flight.[2]

As soon as we come to bipeds with hands, however, these reasons do not hold. Their locomotion does not depend on manual symmetry, and any dextrality, however slight, would be of direct advantage in climbing, fighting, breaking sticks,

[1] For this reason the human leg, as Brown-Séquard says, is not as one-sided as the arm. Any great unevenness would produce lameness and relative incapacity.

[2] The only evidence I know of such a thing is that a cat swims in a circle; but then dogs and horses do not, and these do not drown, while the cat does.

and pulling fruit; since a disproportionate growth of one side would give that side greater strength than either side would possess in animals of symmetrical development in the same environment. A very strong one-armed man can keep at bay a weaker man with two arms, or destroy him; and this is emphasized in animals, where brute force is the only resource. It is difficult to find, however, in the habits of simians any ground for believing that there has been a form of unilateral stimulation which would act to effect a structural change in one hemisphere over and above the other. This, rather than the anatomical causes suggested by Romanes, may be one of the reasons the monkeys have not developed speech. Their conditions of life stimulation are such that there has been no chance for the development of the centre for 'expression' in the left temporal brain-lobe. They have been compelled to maintain bilateral balance of function.

But, apart from this, there is every reason to expect, quite independently of function, that two organs of such comparative separateness and independence of function as the two hemispheres would not remain exactly balanced in function; in short, spontaneous variations giving advantageous dextrality would inevitably arise and persist as soon as the habits of life were not such that more important functions, such as locomotion, tended to suppress them and restore bilateral equilibrium.[1] There are, as far as I know, very few published observations of fact in regard to simian or animal dextrality.[2]

[1] It is on this point that I differ from Wilson, who claims that, while some are naturally right- or left-handed, most people owe the peculiarity to education; the evidence against Wilson's view, apart from my present results, is well put by Mazel, *loc. cit.*

[2] I know only the assertion of Vierordt that parrots grasp and hold food with the left claw, that lions strike with the left paw, and his quotation from Livingstone — 'All animals are left-handed' (Vierordt, *loc. cit.*, p. 428).

It is likely, therefore, that right-handedness in the child is due to differences in the two half-brains, being always associated with speech, that the promise of it is inherited, and that the influences of infancy have little effect upon it. Yet, of course, regular habits of disuse or of the cultivation of the other hand may, as the child grows up, diminish or destroy the disparity between the two. And this inherited brain-onesidedness also accounts for the association of right-handedness, speech, and music faculty, the speech function being a further development of the same unilateral power of movement found first in right- or left-handedness.

II. A further point of psychological interpretation is of some interest. How are we to account for the fact that a bright colour stimulus exposed at a lesser distance brought

Dr. W. Ogle reports observations on parrots and monkeys in *Trans. Royal Med. and Chirur. Society*, 1871. Dr. Ogle informs me in a private letter that the chimpanzee which recently died in the Zoölogical Garden in London was discovered by him to be left-handed. I have addressed a circular letter to some of the officials in zoölogical institutions here and abroad, and hope to gather some facts in this way. If it should prove true that the lower animals are left-sided, then the current view that right-handed children have a preliminary period of left-handedness — a view to which my Table III., above, gives some support — might have its explanation in the hypothesis of the repetition of phylogenetic development in the individual child. My own experience with parrots now (1906) confirms Vierordt. My birds stand on the right and hold the food with the left claw.

It is evident that on this theory of spontaneous variation any change which produced a permanent organic superiority of one hemisphere would be sufficient, and the view that the difference in the hemispheres is due to a better blood supply to the left hemisphere might thus have its justification. As a matter of fact, the arterial arrangements do seem to indicate a more direct blood supply to the left hemisphere (cf. the note of Dr. J. T. O'Connor, *apropos* of my experiments, in *Science*, XVI., 1890, p. 331). It is an interesting inquiry whether this arterial arrangement is reversed in left-handed persons. Wilson cites two cases in which there was no such correspondence (*loc. cit.*, p. 179).

out the right hand, while a neutral stimulus required a greater distance?

The general fact may be expressed in the symbols of the formula which I have proposed for the so-called dynamogenic method of experimentation. It will be remembered that in the formula[1]

$$D=\kappa \; \frac{q}{d},$$

D represented the drawing-out tendency, the amount of dynamogeny exercised by a given stimulus; *q* the quality of this stimulus (colour, etc); and *d* the distance. If the tendency to use one particular hand in preference to the other hand be designated by *r*, we now find from the experiments that

$$r=\kappa \cdot d, \tag{1}$$

but, by the general law that distance decreases influence,

$$D=\kappa \cdot \frac{1}{d}; \tag{2}$$

consequently,

$$r=\kappa \cdot \frac{1}{D}. \tag{3}$$

Again, we find from the experiments that

$$r=\kappa \cdot \frac{1}{q_{\text{(colour)}}}, \tag{4}$$

but

$$D=\kappa \cdot q; \tag{5}$$

consequently,

$$r=\kappa \cdot \frac{1}{D}, \tag{6}$$

the same result as (3).

So it seems from both results of the experiments that

[1] Above, Chap. II., § 3.

right-handedness ***varies inversely as the dynamogenic influence of the stimulus***, whether that dynamogenic influence be colour or distance.

The question of interpretation, then, is this: How does it come that increasing distance, which would be supposed to lessen the calling-out force of a stimulus by lessening its intensity, clearness, etc., yet tends to do exactly what a bright colour at a lesser distance does, *i.e.* to call out increased dynamogeny, with the use of the right hand?

Of course the explanation is evident enough. The child has learned by experience (or has inherited the organic conditions) that more effort, higher D, is necessary in the case of a more distant stimulus; and so a central supply goes out to reinforce the influence D of this distant stimulus, and the right-handedness is the evidence of this reinforced D. We would expect, on the other hand, that the colour, being itself a more dynamogenic stimulus, would have the same effect, without the central reinforcement, and also bring out the right hand.[1] And so it does.

A farther point of interest is seen in the inhibition of the movement altogether when the distance is slightly increased, *i.e.* to fifteen inches or over, as given in the tables. It shows that even at the age of this child very accurate visual estimation of distance has already been acquired, as I had occasion to say in the last chapter. The child's interpretation of the distance inhibits all effort to reach across it. The interpre-

[1] On this point, Professor William James writes (*Science*, Nov. 14, 1890, p. 295), ***apropos*** of my experiments when first announced: "These observations seem very interesting, as showing how strong (attractive) stimuli may produce more definitely localized reactions than weaker ones. The baby grasped at bright colours with the right hand almost exclusively." I find this but natural, not because the reaction is 'more definitely localized,' but because that is an incident to a larger and more massive discharge through the particular channel which is ready for it.

tations undoubtedly result, in the case of the child, in my opinion, from associations of visual indications of distance with sensations of hand and arm movement. And I find that this association gives rise to three determinations — all matters of experience and all becoming remarkably refined — (1) the *safe-reaching distance* (use of either hand or both); (2) the *uncertain-reaching distance* (use of right hand); and (3) the *impossible-to-reach distance* (no hand movement, but a turning away of face and body).

The process of learning this lesson in distance, and with it the waxing ability of the stronger hand, is so graphically described by James in a private letter that I quote it, with his permission: "Admitting the experience hypothesis (which I adopt from you now,[1] since I have made no observations, and your sense of what is likely in this regard seems

[1] In view of my letter in *Science*, Nov. 28, 1890, p. 302. He adds, however, after the above quotation: "Although I have made every possible concession to the experience theory, as adopted by you, I must say that the notion of a specialized native impulsiveness for the right hand when certain distances appeal to the eye lingers in my mind as that of a natural possibility." This is refuted, I think, if it be a fact that infants 'grasp at the moon' with either hand indiscriminately, the 'moon' standing for any object at any distance. The possibility of such native adaptations cannot be doubted, for some young animals seem to have different native responses adjusted to different distances; but in the case of the child, experience seems to be waited for to develop many things which are really native.

I endeavoured to test H.'s native sense of locality on the body, apart from the association with sight, by dangling my watch-chain gently from day to day on the top of her head, and by gently pinching one or other of her ears occasionally, watching the movements of her hands in their search for the chain and the ear. Up to about the middle of her third month the hand movements seemed perfectly random, 'up' and 'back' being about the only tendencies which indicated any sense of locality whatever. In the third month, however, she seemed to begin to learn where to find the objects, especially the ear; but the success was apparently due to the experience. Cf. Lloyd Morgan's instances of 'probably instinctive' actions, in *Habit and Instinct*, Chaps. II., IV., where he cites these results.

to me to have great weight), the way I represent the matter to myself is thus: The child originally responds to all optical excitements which strike his attention by bounding up and down, and moving both arms. Ere long the movement becomes one of grasping with both. Some graspings prove easy, and the original bilateral medianism continues for a while associated with these. Others are protracted; and the superior native efficiency of the right hand, in reaching the goal, here acts so as to inhibit the left hand altogether when the stimulus suggests a case of this kind. Others, again, never succeed, the object being beyond range altogether; and all movements are inhibited for these at last."

Now, the point to be observed is this, that the dynamogenic effect of distance (d in the formula) is not natively provided for, as is that of quality (q, colour in this case): it is an acquired effect, called out through experiences of relative distance. Relative distances are 'interpreted' in terms of past experience, and this gives them their present force. The course of the nervous disturbance is through the higher circuit which association involves, and which on the motor side implicates attention; while the dynamogenic effect of colour or of sensation qualities generally, which prompt native reactions, is by a lower reflex circuit. One is an ideo-motor reaction, based on association; the other is a native sensorimotor reaction.

It is necessary, therefore, again to alter profoundly our conception of the simplest dynamogenic formula in view of the element of association in the simplest reaction involving distance. And it is easy to see what becomes of the formula as soon as association gets to be a little complex; for d, we must substitute a symbol to stand for the central influence as a whole, say ϕ; and of course with increasing complexity of experience the meaning of ϕ becomes more and more recondite. With adults, therefore, such a formula would be in most cases nothing more than tautology.[1] With infants it

[1] The only way to experiment on volition, accordingly, is by using comparative stimulations of no meaning or association, or by keeping the association element constant, by using the same stimulation repeatedly. I have endeavoured to experiment on volition by observing the effect on action of the same stimulation apprehended through different senses, *i.e.* the tendency to draw a figure *seen* in one case and *traced* by the hand in the other (*Proc. Cong. Exper. Psych.*, London, 1892, p. 51); see below, Chap. XIII., § 3.

A further point deserves a word. In the original announcement of these experiments I found it necessary to think that the child's reaching with the right hand only in cases involving long distances and effort could not be explained without supposing that her sense of motor discharge in the case of effort was something different from that in case of movements without effort, *i.e.* that there was a central sense of motor potential of some kind. Professor James in *Science* and in private letters, and Professor Dewey later in a private letter, suggest that the child might be guided by its sense of greater success, skill, ease, etc., in the case of earlier right-hand movements — all peripheral, not central, elements. I am not strenuous for my interpretation; indeed the other seems to me now more natural and simple. It is to be hoped that more experiments will be forthcoming; but with my experience with both my children I find certain facts which I cannot explain on the peripheral view: (1) The child does *not* show differences of ease, skill, etc., in favour of either hand at this early age, as far as can be detected; (2) after beginning to use the right hand for strenuous efforts the two hands are still used indiscriminately for easy movements, near distances, etc. How can this be explained? Why should not the child economize — as adults do — in all movements, using the right hand after experience of its 'greater efficiency' for everything, when circumstances permit? The view of Professor James seems to require what I may call a 'cat and kitten' arrangement of nervous discharges, *i.e.* certain pathways of voluminous discharge for right-hand movements opened up by earlier more successful movements, and, at the same time, other pathways *for the same discharges* when less voluminous — not due to the earlier successful movements. We have not knowledge enough to say it may not be; but it looks to me like a 'large hole for the cat and a little hole for the kitten' — an arrangement which Professor James argues against, at least in one connection (*Princ. of Psychology*, Vol. I., p. 592). But that the child does extend the use of the right hand, even when circumstances would seem to discourage it, is seen in, (3), the very striking fact, that the right hand is used to grasp objects, etc., which lie on the left side of the child; movements in which the left hand would seem to have actually more skill, ease, and practice. Professor Ladd seems to accept my first interpretation (*Psychology, Descriptive and Explanatory*, p. 222).

remains useful only for such elementary experiences as those I have enumerated above.

Again, as at the end of the last chapter, I must call attention not only to the complication which these experiments give to the method of studying children, but also to the fine uniformity which appears through them in the working of the law of dynamogenesis, upon which rests the theory of development stated in the following chapters.

CHAPTER V

INFANTS' MOVEMENTS

§ 1. *Descriptive; Tracery Imitation*

IN earlier chapters, the general conditions of infants' responses in movement have been pointed out and some special problems set: a few further points of interest may now be brought up in connection with the rise of the more complex movements.

From the beginning of independent life, movement is the infant's natural response to all influences. And, more than this, Bain and Preyer seem to have made out their case, that from the outset there are movements which are spontaneous, due to discharge of the motor centres unsolicited by definite external stimulations.[1] At any rate, no observation made after birth can decide the question one way or the other whether sensation or movement is the earlier fact in ontogenetic development. It remains for the embryologists to continue their work, and this is where Preyer's results get their principal value.

Reflexes. — In regard to movements more properly reflex and responsive, I may record a few detached observations on my child. Carefully planned experiments with her, made in the ninth month, showed the native walking reflex — alternative movement of the legs — very strongly marked. I held her by the body, having made the legs quite free, in a posi-

[1] A position extended to micro-organisms by Jennings, *Behaviour of Lower Organisms*, 1906.

tion which allowed the bare feet to rest lightly upon a smooth table. The reflex seemed to come somewhat suddenly, for up to the middle of the eighth month I could not discover more than a single alternation; and this I had determined not to take as evidence, since it might well arise by chance. But, in the ninth month, I observed as many as three and four well-regulated alternations, in succession. At first most of these movements were the reverse of the natural walking movements, being oftenest such as would carry the child backward. This, however, passed away. I have the following note on June 13, 1890, the child being one day short of nine months old: "Walking movements, 3 to 4 alternations, backwards oftenest, but tending rapidly to forward movements; later, 2 experiments, each showing 3 to 4 alternations forwards very plainly;" and on June 19: "Fine activity in walking reflex — good alternations, but more backwards than forwards — clearly reflex, from stimulus to the soles." It is easy to see that this backward alternation [1] might be due to some accident of stimulation or discharge when the reflex was first called out; a tendency which early efforts at creeping would soon correct. Yet in H.'s case, it was so marked that for a period she preferred to creep backward.[2]

A few observations were made also upon unilateral reflexes.[3] A gentle touch with finger or feather on the cheek,

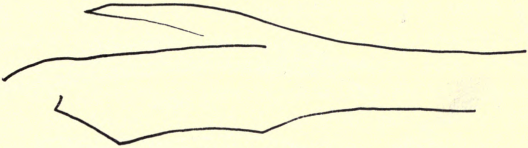
[1] Two other cases of this have been verbally reported to me. A. G. Parrott reports such alternative movements in a boy twelve weeks old. The second exact observation I owe to Professor Cattell.

[2] For interesting experiments on the method and variations of walking by different children of both sexes and by adults, see H. Vierordt, *Der Gang des Menschen* (Tübingen, 1881). Similar valuable observations might be made by measurements of the intervals, directions, etc., of children's footprints in the damp yielding sand of the seashore.

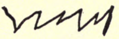
[3] Cf. Kussmaul, *Untersuchungen zur Seelenleben der Neugebornen Menschen*, p. 18, for similar experiments; and Vierordt, in *Gerhardt's Handbuch der Kinderkrankheiten*, I., p. 215.

or beside the nose, or upon the ear, when H. was sleeping quietly upon her back, called out always the hand on the same side. After two or three such irritations, her sleep became troubled and she turned upon the bed, or used both hands to rub the place stimulated. Tickling of the sole of the foot also, besides causing a reaction in the same foot, tended to bring about a movement of the hand on the same side. These observations, not a large number, were made in the sixth, seventh, and eighth months.

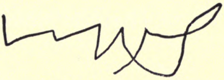
In order to test the growth of voluntary control over the muscles of the hand and fingers, I determined to observe the phenomena of H.'s attempts at drawing and writing, for which she showed great fondness as soon as imitation was well fixed. Selecting a few objects well differentiated in outline, — animals which she had already learned to recognize and name after a fashion, — I drew them one by one on paper and let her imitate the 'copy.' The results I have in a series of 'drawings' of hers, extending from the last week of her nineteenth month to the middle of the twenty-seventh month. The results show that, with this child, up to the beginning of the twenty-seventh month there was no connection apparent between a mental picture in consciousness and the movements made by the hands and fingers in attempting to draw it. The 'drawing' was simply the vaguest and most general imitation of the teacher's movements, not the tracing of a mental picture. And the attempt was no better when a 'copy' was made by myself on the paper — a rough outline drawing of a man, etc. There was no semblance of conformity between the child's drawing and the copy. Further, while she could identify the copy and name the animal, she could not identify her own effort, except so far as she remembered what object she set out to make. See Figures I., II., III., and IV., for specimens illustrating the straightness and rigidity of her early attempts.



Man: 19th month.



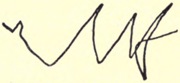
Cat: 10th month.



Man: 20th month.

FIG. I.—EARLY DRAWINGS WITH COPY

Man: 20th month.

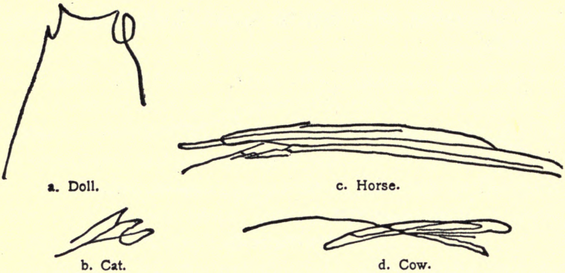


Bird: 20th month.

FIG. II.—EARLY DRAWINGS WITHOUT COPY

With it all there was on her face an expression of dissatisfaction with her later attempts, similar to that which one observes in the efforts of the year-old to speak. My little girl would hide her head after making a drawing, extend the pencil to me, and say, 'Papa make man.' It seemed to indicate a sense of what was expected beyond the ability to attain the process of accomplishing it.

In Figs. III. and IV. we see some growth in variety of shape and direction with increased mobility of the hand and arm, but still no imitation in outline is apparent.



a. Doll. c. Horse.

b. Cat. d. Cow.

FIG. III.—DRAWING WITHOUT COPY: END OF 25TH MONTH

a. Man (two trials). b. Bird.

FIG. IV.—WITH COPY: EARLY IN 26TH MONTH

Fig. V. shows further complications in movement.

a. Man: with copy. b. Man: without copy.

FIG. V.—LATER MORE COMPLICATED DRAWINGS

In the nature of the movements which the child made in this series of drawings, there is marked change and development which may be briefly described. There is growth from angular straight lines to curves, from movements one way exclusively to reverse movements, and an increasing tendency to complex intricate figures, which last probably results from greatly increased ease, variety, and rapidity of movement. At first she made only sweeping 'arm movements,' then began to flex the wrist somewhat, and toward the end of the series given above, as is evident in the figures, with no teaching, manipulated the pencil with her fingers considerably. This seems to give support to the opinion of professional writing-teachers that the 'arm movement' is most natural and effective for purposes of penmanship.

Further, all her curves were made by movements from left to right going upward and from right to left downward, like the movements of the hands of a clock (see the arrow-heads in Fig. V. a). This is the method of our usual writing as contrasted with 'back-hand.' She also preferred lateral to vertical movements on the paper. Her most frequent and easy 'drawing' consisted of a series of rapid right and left strokes almost parallel to one another, constituting very narrow and long loops.

But early in the twenty-seventh month a change came. I drew a rough human figure, naming the parts in succession as they were made: she suddenly seemed to catch the idea of tracing each part, and she now for the first time began to make figures with vertical and horizontal proportion; *i.e.* she followed the order she saw me take: 'head' (circle), 'body' (ellipse) below, 'legs' (two straight lines) further below, 'hands' (two lines) at the sides of the body. It was all done in the crudest fashion, as would be expected from the lack of muscular co-ordination. But the fact was unmistakable that with the simplification of the figure by breaking it up into parts had come also the idea of *tracery imitation*, and its imperfect execution. By the 'idea' of tracery imitation, I mean the sense of connection between what was visually in her own consciousness and the movement of her own hand or pencil. The visual pictures or copies had been there in all her previous trials, and so had the hand movements, both the sight of them and the muscular sensations; but there had been no sense of a connection between them and agreement in the result when they were compared.

As yet, however, it was limited to two or three copies — objects which she saw me make. That it was now not simply imitation of my movements is evident from the fact that she did not imitate my movements: she looked intently upon the figure which I made, not at my movements, and then strove to imitate the figure with movements of her own very different from mine. But she had not generalized the idea away from particular figures, for she could not trace at all an altogether new figure in right lines. Further, she traced these particular figures just as well without written copies before her: *here, therefore, is the rise of the tracery imitation of the child's own mental picture* — a fact of great theoretical interest.[1]

Fig. VI. reproduces the first successful imitation of a visual copy, the copy which she imitated being also given.

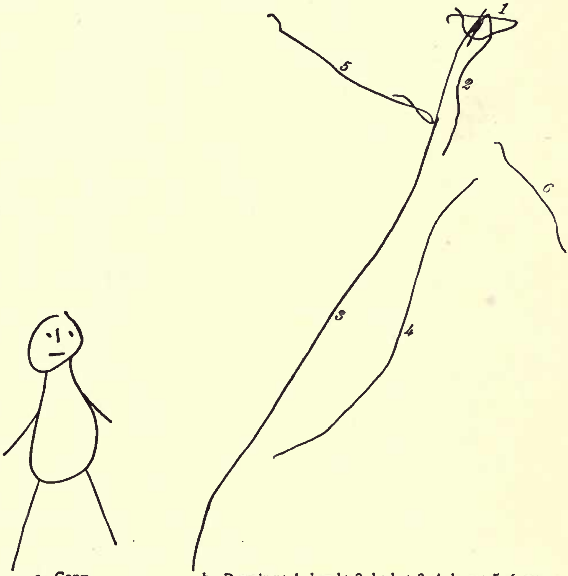
Figs. VII. and VIII. show further development in freedom and complication.

A curious phenomenon, which has been noticed also by Passy[2] in the drawings of much older children, was evident in H.'s attempts to extend her drawings to other objects. This is the tendency to neglect the new object or copy and

[1] See first announcement in *Science*, Jan. 8, 1892.

[2] *Revue Philosophique*, December, 1891, p. 614.

substitute for it in whole or part some drawing which she had already learned to make. For example, having ana-

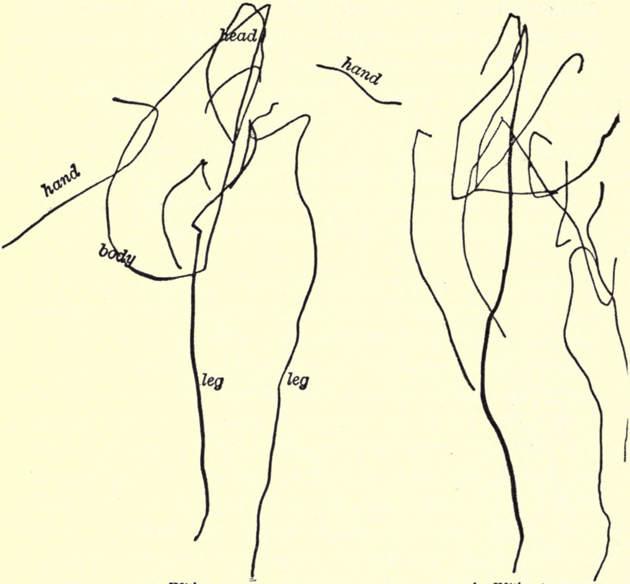


a. Copy.

b. Drawing: 1, head; 2, body; 3, 4, legs; 5, 6, arms (all in the order in which they were made).

FIG. VI.—FIRST SUCCESSFUL TRACERY IMITATION: DEC. 8, 1891 (LAST WEEK OF 27TH MONTH)

lyzed man after me into head, body, legs, and arms, this became her scheme for drawing all other creatures. When told to draw a bird after a copy set before her, she gave it all these features, conforming them in a measure to the general shape of a bird, but putting two strokes at the sides for *arms*. I shall say more about this fact in the next sec-



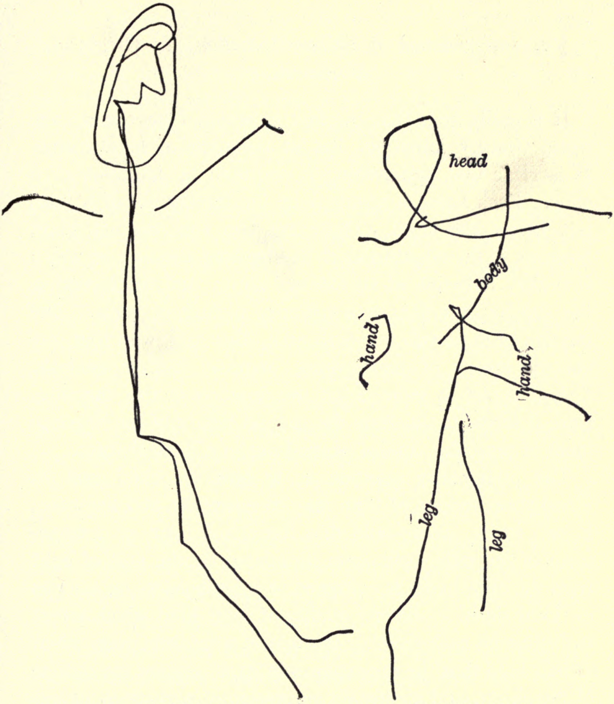
a. With copy. b. Without copy.

FIG. VII.—MAN: DEC. 13, 1891 (LAST DAY OF 27TH MONTH)

tion in discussing the origin of handwriting; it is also suggestive in connection with the rise of the general notion.[1]

The differences to be seen by comparing a. and b. in each of the Figs. VII. and VIII. show the degree in which the child was still dependent upon the external visual copy for the control of her imitation tracings. She copied her memory picture, at least when she had no external copy; but she controlled the reproduction by the copy, when she had it.

[1] See below, Chap. XI., § 1.



a. With copy. b. Without copy.

FIG. VIII.—LATE DRAWINGS: MAN (28TH MONTH). THE WORDS WRITTEN IN FIGS. VII. a. AND VIII. b. ARE FROM THE CHILD'S OWN UTTERANCES, TAKEN DOWN AT THE TIME, AS SHE DREW THE SEVERAL PARTS. THE APPARENT FACIAL OUTLINE IN a. OF THIS FIGURE IS, I THINK, PURELY ACCIDENTAL.

§ 2. *Interpretation of Tracery Imitation: the Origin of Handwriting*

It is easily seen that the fact to which I have given the name 'tracery imitation' lies at the basis of handwriting. It is clear that handwriting is acquired by imitation of a copy. Each letter is acquired by the tracing out of a form put before the child. There are two very distinct steps, however, in the acquisition of handwriting, the first of which is tracery imitation of an external copy; and the second is the similar imitation of a memory picture or form. The relation of these two things to each other and, with that, the general theory of handwriting, requires farther analysis. I shall depict in some detail the progress of this function, since it serves to illustrate the general theory of the development of muscular control worked out in a later chapter.

The preliminary question as to how the child gets its visual apprehension of form may be answered, and has been, in two ways. Some hold that the actual form or arrangement of the retinal elements stimulated by the rays of light from the object seen is conveyed to consciousness by a series of 'local signs' — distinct quality of some kind which serves to distinguish each visual or anatomical point from every other. Others hold that the eye explores in its movement the outline of the object, and a constant succession of sensations of eye movement thus represents the particular form explored. It is safe to say that, whether one or both of these causes operate to give the child its form intuition, we can still say that there is a constant series of sensations from the eyes, which can be run over in one direction, or the reverse; this we may call the 'visual form series,' v, v', v'', in the analysis of handwriting.

But the child, in setting out to draw, moves his hand, thus getting sensations from the hand itself according to its locality at this moment and at that. If you consider the hand as moving slowly, it will be evident that there are touch sensations, joint sensations, muscle-tension sensations, etc., giving together a certain massive sense of the locality of the hand as it goes from place to place. With no care as to the exact character of these sensations, we may yet say that there is a series which is constant for the drawing of the outline of a plane figure; this series we may call the 'muscular form series,' denoted by m, m', m''.

But, further, the child has other means of finding out about movements than by the sensations from his own hand and arm. He sees other people's movements and his own. In this case of drawing, he is instructed in holding his pencil, sees his teacher move his pencil over the paper, sees his own arm and hand and pencil-point in each case. This, it is evident, gives a more or less exact additional series of eye sensations, according as the child is able by frequent following of the movements of others and himself to appropriate each such set of movements to a regular visual form. This third series of sensations, in a particular case, we may call the 'optical movement series,' o, o', o'', etc.

It is evident that the acquisition of writing involves all of these three series; and it is easy to show that they are all present in our most rapid and careless writing. If one shut his eyes and write, he preserves the general form of the letters, but they are badly made compared with those which he makes when he sees his pen and follows its movement. This shows his dependence upon the o series. But he can still very greatly improve his penmanship if his paper be ruled, or more again if he write after a well-written copy; this shows the dependence, relatively slight, upon the v

series. As to the revival of the *v* series also, as copies to which to conform, cases of verbal blindness show that lesions of the optical brain centre may make it impossible for one to write at all.[1] Further, if we try to write with the skin benumbed with cold, or on a surface which yields, the letters are made without form and thrown out of their due proportion. This in turn shows the continual presence of the *m* series.[2]

That a child gets his visual form (*v*) series first is proved from his recognition and even naming of figures, pictures, etc., before he draws them or sees them drawn. These series are at first few, but he gradually adds to them as the range of his exploration becomes wider and as familiar objects become in his experience more and more familiar. There is a constant tendency, therefore, from the random wandering of the eyes over many forms and over shapeless things, to concentration on interesting, familiar, and regular forms of things. So we may say there is a continual growth and upbuilding of different *v* series.

This is at the expense of the optical movement (*o*) series, as may be seen from the following considerations: At first the child follows all movements, that he sees, of himself and of others, with equal attention — his eye is a slave to movement anywhere and everywhere — his attention is reflex and visual. He looks closely at his own movements. His visual figure series follows in consciousness the cue set by his optical movement series, term by term, thus: —

$$\begin{array}{lccccc} \longleftarrow & o, & o' & o'', & o''', & \text{etc.,} \\ & \diagdown & \diagdown & \diagdown & \diagdown & \\ \longleftarrow & v, & v', & v'', & v''', & \text{etc.} \end{array}$$

[1] See cases cited by Brazier, *Revue Philosophique*, October, 1892, p. 338.

[2] See Goldscheider's demonstration of the importance of pressure sensations in handwriting, *Physiologie u. Pathologie der Handschrift*, in *Zeitschrift für Psychiatrie*, XXIV., 1892.

But when he learns, as I have said, to select his *v* series, he then reverses his association and so has to select out certain *o* series. He sees and attends to the movements that interest him, the things that concern him; he prefers the toys which his eye explores by preference. So, continually, the *o* series get broken up and formed anew, according as the *o* elements are lined up anew under the lead of the *v* series, thus: —

$$\begin{array}{llllll} \longleftarrow & v, & v', & v'', & v''', & \text{etc.,} \\ & \diagdown & \diagdown & \diagdown & \diagdown & \\ \longleftarrow & o, & o', & o'', & o''', & \text{etc.} \end{array}$$

Now there, in this association, is the rise of 'tracery imitation' in its crudest form; this reversal of association between the *o* and the *v* elements. Its characteristics, as imitation, are merely the vaguest indications of direction and proportion. It utilizes no constant *m* series; that is, no constant detailed series of hand and arm movements, but only the up and down, and right and left, movements acquired by the child in its early random exercises, together with whatever more definite movements education may have produced. As I interpret it, H.'s ability suddenly to 'imitate' my drawing of a man was largely the discovery that by a series of ordinary movements of her own which she saw (*o* element), and which her random practice had made easy, she could bring about, in a measure, what I did. Instead of her eye following the tracing left by the point of the pen (*v* series subordinated to *o* series), as formerly it did, she now found that her hand and pen, as she watched them, could follow the outline I had made, or her memory of it (*o* series subordinated to the *v* series).

Such as it is, however, tracery imitation is a long way from handwriting. And the essential difference is the introduction of sensations of movement (*m* series), whereby the operations of the hand are held in control. How, then, does the *m* series get its influence?

Eye movements start in a chaotic random state, as we have seen, and only gradually take on the definite character of separate series, as the customary explorations, fixations, visual curiosities of experience serve to fix them. But arm movements are just the reverse. At first the arm is capable of very few movements, the elbow of one, and the fingers of none. Moreover, the joints are stiff, the movements to a degree inconvenient, and all ventures away from certain reactions provided for by native arrangements are painful and unsuccessful. This means that the child starts with certain very definite arm movements (*m* series). But this does not last. He gets limbered up. His *m* series gets broken into units and recombined into new series. This is seen in the progress shown in H.'s series of drawings given above.

This prepares the way for a second victory of the *v* series. At first the hand must move in certain directions represented in consciousness by the series m, m', m'', etc.; the eye can move in any direction indifferently; so the eye follows the hand, and we have in consequence:—

$$\begin{array}{cccccc} \longleftarrow & m, & m', & m'', & m''', & \text{etc.,} \\ & \diagdown & \diagdown & \diagdown & \diagdown & \\ \longleftarrow & v, & v', & v'', & v''', & \text{etc.} \end{array}$$

But as the *m*'s get broken up out of their native series and the *v*'s get tied together into series, there comes a conflict for leadership, followed by the reverse association:—

$$\begin{array}{cccccc} \longleftarrow & v, & v', & v'', & v''' & \text{etc.,} \\ & \diagdown & \diagdown & \diagdown & \diagdown & \\ \longleftarrow & m, & m', & m'', & m''' & \text{etc.} \end{array}$$

Now certain muscular sensations (*m* elements) represent movements which, being also seen, have *o* elements attached to them. And we have already seen that tracery imitation requires a certain correspondence between relatively fixed *v* series and relatively free *o* series. The breaking up of the *m* series just described now makes it possible for more of these correspondences to occur, *i.e.* for more movements seen to describe figures seen. Now it is by the gradual increase of these correspondences, this practice and emphasis into habit, that handwriting is built up with much effort.

There is, therefore, an extremely close association between a visual figure series and the series of hand movements required to reproduce it. And this association between them is secured by the reproduction concomitantly through the seen hand movements (*o* series) of a real figure which conforms to the original visual ideal by which the whole is prompted. To complicate our illustration, this is what we finally get: —

$$\begin{array}{llllllll}
\leftarrow v, & v', & v'', & v''', & \text{etc.,} & & & \\
& \diagdown & \diagdown & \diagdown & \diagdown & & & \\
& \leftarrow o, & o', & o'', & o''', & \text{etc.,} & & \\
& & \diagdown & \diagdown & \diagdown & \diagdown & & \\
& & \leftarrow m, & m', & m'', & m''', & \text{etc.} &
\end{array}$$

It is easy to see, therefore, that in handwriting the movements made are controlled by two different but concurring agencies: first, the sensations in the arm and hand must be, point by point, those called for by the fast associations of movement with letter outlines. This tendency is actually so strong in the young child who has learned to make a few figures successfully, that it draws new objects like the old shapes, even when they are really very different, and in spite of close attention to the plain copies put before them. And, second, the figure which the eye takes in as the pen point inscribes it, must also agree, point by point, with the outline figure which is held in consciousness and aimed at.

With the further development of handwriting, the performance tends to become independent of sight. In swift writing we use our eyes mainly to keep on the line and on the paper, not to see that the letters are made properly. As far as we do examine them, it is only to see that they fall within the limits of legibility; and we know so well about what our hand can do, that we rarely have occasion to revise a word once written. The muscular series (*m* series) becomes so delicately adjusted to the needs of the memory image of figure, of letter, and of word (*v* series), that a further optical test (*o* series) is not required.

It is interesting to note, also, that this growing independence in the sensations of movement under practice and habit may go so far that the visual copy (*v* series) may be dispensed with altogether; this is shown to be true in pathological cases of alexia, or inability to read, which do not involve agraphia, or inability to write. In these cases we have the extreme motor type of verbal memory, emphasized by Stricker: persons who remember written words by the memory of the sensations involved in writing them.

A further fundamental question arises, however, when we come to examine the actual parallelism of the associated series of elements involved. How does it come about that the child is able to secure the agreement, term by term, between the elements of the v and the m series respectively — the agreement by which this association is established? How does he get v with m, v' with m', v'' with m'', in this regular way, and both in proper association with o, o', o'', etc.? This is the question of the possibility of any adaptation of movements to ends, whether voluntary or not. Its discussion is taken up later,[1] and in that connection the general principles are given by which this case may be solved with others.

I need not go into the further questions of the pathology and abnormalities of handwriting. The kinds and varieties of agraphia — inability to write, from nervous lesion — are well classified, on the basis of impairment of one or more of the elements involved, by Goldscheider, in the paper already quoted. His explanation of mirror-writing is, however, so clearly a proof of the adequacy of the point in which his theory and mine agree, that I may briefly explain it.

Mirror-writing is the form of inscription which arises from tracing words with the left hand by an exact reduplication of the movements of the right hand, in a symmetrical way from the central point in front of the body, out toward the left. It produces a form of reversed writing which cannot be read until it is seen in a mirror. Many left-handed children tend to write in this way. Some adults, on taking a pen to write with the left hand, find they can write only in this way. Even those, like myself, to whom the movements seem, when thought of in visual terms, quite confusing and impossible, yet find, when they try to write with both hands together, in the air, from a central point right and left, that the left-hand mirror-writing movements are very natural and easy. Now, why is it?

If a man is of the so-called 'visual' type, *i.e.* if he depends mainly on his v series, recalling, in his writing, the *look* of the letters, etc., and by comparing it with the resulting writing, conforming his movement series to it, then any move-

[1] It is the fundamental fact of motor adjustment or 'Accommodation,' by 'selection from over-produced movements,' to which I give the name 'functional selection,' as discussed below, Chap. VII.

ments which violate the figure presented by visual memory are unintelligible. Such a man must reproduce, with his left hand, the visual images as produced by the right. That is, he must write from left to right with both hands, using visually symmetrical images. This represents the power of the *v* series to bring the movements of both hands into conformity to it. If, on the contrary, his *m* series has grown independent by practice, and he remembers written words not by the way they look mainly, but by the way it feels to write them — if he is of the so-called 'motor' type in his handwriting — then his left-hand writing must reproduce the series of muscular sensations, as his right-hand writing has established them. This represents the power of movements established by one hand to carry the other hand also with it in a symmetrical way. His left-hand position must duplicate at each moment his right-hand position, when he comes to try the experiment of writing in the air with both hands. This gives symmetrical movements with the two hands, which means mirror-writing with the left hand.[1]

The following notice and criticism of Goldscheider's paper, revised slightly from an earlier review[2] of it, may serve to show the difference between my theory and his, and at the same time sum up the foregoing discussion.

Goldscheider gives first a theoretical account of the origin of what I have called 'tracery imitation' under the equivalent phrase *malende Reproduction*, endeavouring to account for the association between visual pictures (letters, figures, etc.) and the hand movements necessary to reproduce them

[1] This has been held by Fechner and others to be a strong proof that the discharge of energy into one side of the body tends to stimulate the corresponding members of the other side to similar movements (*Mitbewegungen*). I have mentioned already that my experiments on the infant's use of its hands tend to confirm this view.

[2] *American Journ. of Psychology*, V., 1893, 420–422.

(as in drawing, writing, etc.). He finds three factors or 'moments' in the rise of tracery imitation:[1] *A*, an optical picture of the hand movements required for making the required figure (*optische Vorstellung der Handbewegung;* my *o* series), derived from the child's earlier sight of his own and others' hand movements; *B*, a series of new motor discharges strengthened by practice, felt as *C*, a series of sensations of actual movement, by which the discharges are regulated and controlled (*motorisches Bewegungsbild;* my *m* series). Moment *A* is clearly seen in the fact often remarked, that in writing with the eyes closed we still follow the pen point in its inscription of an optical outline. Further, in moment *A* there are two factors: first, constant memories (*Bilder*) of each position, and of each amount and direction of movement of the member (my *m* series); and second, optical presentations of the same positions and movements. Here we have, therefore, movements both felt and seen. Tracery imitation then consists in the fact that new movements are held, through the sensations they give, into conformity to the series established by being both felt and seen.

This, it is at once seen, leaves out of account altogether the visual figure series (my *v* series) established quite independently of hand movements. Goldscheider's theory is, therefore, in so far inadequate, for it assumes tracery imitation, *i.e.* it supposes that the hand has already gone over the figure to be imitated, giving moment *A* (requisite movements both felt and seen). But the question remains behind this: How were such series selected from other movements felt as well as seen? How does the optical presentation of figure (*optisches Bild des Gestaltes*) get associated point by point with the twofold series (*m* series and *o* series) represented by Goldscheider's moment *A*? Goldscheider does not take

[1] See p. 587 of the art. cited, where he gives a *résumé*.

account of the fact that visual recognition of figure (letters, pictures, etc.) is definitely established long before the child is able or has any tendency to try to trace them, as has been shown above. He is wrong, accordingly, in identifying the original optical figure series with the optical hand movement series.

The question at issue then is: How does the purely visual figure series (*v* series) come to stimulate the two series which originate from the movement (*m* and *o* series). My observations show — to sum up the foregoing pages — that the process is as follows: As the child's experience widens, its optical perception of figure grows exact, so that certain retinal or eye movement series grow more and more fixed. At this period the arm and hand movement series, at first few and fixed, are broken up with the increasing mobility of the member. Consequently, (1) from the arm movement sensations those elements are emphasized which represent movements seen as well as felt, and (2) from the latter those are further emphasized which produce results identical with elements in certain definite figure series already established by the eye. This reproduction of visual figure elements, by movements which are both seen and felt, establishes firmly the association between the movement sensations (*m* series) and the figure presentations (*v* series), and the optical memories of the hand movements (*o* series) tend to fall away.

The validity of this analysis as opposed to that of Goldscheider rests then upon the evidence that the child has a sense of figure established first by vision alone. Several points may be cited in support of this view: 1. The child recognizes letters, pictures, etc., before it is able to trace them or speak their equivalents. 2. We can trace figures by movements of the head, foot, trunk, etc., — movements which we cannot see. If our sense of figure is independent of any particular thing that moves, it is easy to see how this is possible. If, on the contrary, the sense of figure is derived entirely from movements both felt and seen, it is difficult to see how such accomplishments are to be accounted for. 3. In memories of actual writing, for example, my autograph, I, for one, picture clearly the way the letters look as they are left by the pen on the paper, and also the sensations of movement in the hand and arm: but hardly at all the way the hand or pen movements look at the successive stages of the signature. 4. In the case of writing, a blind man has no series corresponding to the look of the actual movements to those who see: he writes by the association between his movement sensations and the touch figure series which corresponds to the visual figure series of the man who sees.[1] 5. In another analogous case, the child's learning to speak, there are only two elements, the auditory series, in the case, we will say, of the gutturals, which infants sometimes learn first, and the sound series which results from the child's own voice (omitting the movement sensations which are not in question); there is no hearing of the movements of speech in addition to the hearing of the sounds spoken, *i.e.* nothing at all corresponding to Goldscheider's optical hand movement series, considered as distinct from the resulting visual figure series. In hearing, accordingly, the auditory sound 'copy' series corresponds to my visual figure 'copy' series.

[1] Cf. Broadbent's remarks on the writing of the blind, *Brit. Med. Journ.*, 1876, I., p. 435.

CHAPTER VI

Suggestion

§ 1. *General Definition*

The rise of hypnotism in late years has opened the way to an entirely new method of mental study. The doctrine of reflexes was before largely physiological, and only pathological cases could be cited in evidence of a mechanism in certain forms of consciousness as well as out of it; and even pathological cases of extreme sensitiveness to casual suggestion from the environment or from other men did not receive the interpretation which the phenomena of hypnotic suggestion are now making possible, *i.e.* that suggestion by idea, or through consciousness, must be recognized to be as fundamental a kind of motor stimulus as the direct excitation of a sense organ. Nervous reflexes may work directly through states of consciousness, or be stimulated by them; these states of consciousness may be integral portions of such reflexes; and, further, a large part of our mental life is made up of a mass of such ideo-motor 'suggestions,' which are normally in a state of subconscious inhibition.

Without discussing the nature of the hypnotic state in the first instance, nor venturing to pass judgment in this connection upon the question whether the suggestion theory is sufficient to explain all the facts, we may yet isolate the aspect spoken of above, and discuss its general bearings in the normal life, especially of children. Of course, the question at once occurs, is the normal life a life to any degree of ideo-motor or suggestive reactions, or is the hypnotic sleep in this aspect of it, quite an artificial thing? Further, if such suggestion is normal or typical in the mental life, what is the nature of the inhibition by which it is ordinarily kept under — in other words, what is its relation to what we call will? Leaving this second question altogether unanswered for the present,[1] it has occurred to me to observe children, especially my own H. and E., during their first two years, to see if light could be thrown upon the first inquiry above. If it be true that ideo-motor suggestion is a normal thing, then early child life should present the most striking analogies to the hypnotic state in this essential respect. This is a field that has hitherto, as far as I know, been largely unexplored by workers in the psychology of suggestion.

It is not necessary, I think, to discuss in detail the meaning of this much-abused but, in the main, very well defined word, 'suggestion.' The general conception may be sufficiently well indicated for the present by the following quotations from authorities. They all agree on the main phenomenon, their definitions differing in the place of emphasis, according as one aspect rather than another supplies ground for a theory. I may gather them up in my own definition, which aims to describe the fundamental fact apart from theory, and is therefore better suited to our preliminary exposition. I have myself defined suggestion as "from the side of consciousness . . . the tendency of a sensory or an ideal state to be followed by a motor state,[2] in the manner typified by the abrupt entrance from without into consciousness of an idea or image, or a vaguely conscious stimu-

[1] See, however, Chap. XIII., below.

[2] *Science*, Feb. 27, 1891, where many of the observations given in this chapter were first recorded.

lation, which tends to bring about the muscular or volitional effects which ordinarily follow upon its presence."[1]

Janet defines suggestion as "a motor reaction brought about by language or perception."[2] This narrows the field to certain classes of stimulations, well defined in consciousness, and overlooks the more subtle suggestive influences emphasized by the Nancy school of theorizers. Schmidkunz makes it: "die Herbeirufung eines Ereignisses durch die Erweckung seines psychischen Bildes."[3] This again makes a mental picture of the suggested 'event' in consciousness necessary, and, besides, does not rule out ordinary complex associations. It neglects the requirement insisted upon by Janet, *i.e.* that the stimulus be from without, as from hearing words, seeing actions, objects, etc. Wundt says: "Suggestion ist Association mit gleichzeitiger Verengerung des Bewusstseins auf die durch die Association angeregten Vorstellungen."[4] In this definition Wundt meets the objection urged against the definition of suggestion in terms of complex association, by holding down the association to a 'narrowed consciousness'; but he, again, neglects the outward nature of the stimulus, and does not give an adequate account of how this narrowing of consciousness upon one or two associated terms, usually a sensori-motor association, is brought about. Ziehen: "In der Beibringung der Vorstellung liegt das Wesen der Suggestion."[5] Here we have the sufficient recognition of the artificial and external source of the stimulation, but yet we surely cannot say that all such stimulations succeed in getting suggestive force. A thousand things suggested to us are rejected, scorned, laughed at. This is so marked a fact in current theory, especially on the pathological

[1] Cf. also *Handbook of Psychology*, II., 297.

[2] *Aut. Psych.*, p. 218.

[3] *Psych. der Suggestion.*

[4] *Hypnotismus u. Suggestion*, II. Abs.

[5] *Philos. Monatshefte*, XXIX., 1893, p. 489.

side, that I have found it convenient to use a special phrase for consciousness when in the purely suggestible condition, *i.e.* 'reactive consciousness.'[1] The phrase 'conscious reflex' is sometimes used, but is not good as applied to these suggestive reactions; for they are cortical in their brain seat, and are not as definite as ordinary reflexes.

For our present purposes, the definition just given from my earlier work is sufficient, since it emphasizes the *movement side* of suggestion. The fundamental fact about all suggestion, — not hypnotic suggestion alone, which some of the definitions which I have cited have exclusive reference to,[2] — is, in my view, the removal of inhibitions to movement brought about by a certain condition of consciousness which may be called 'suggestibility.' The further question, what makes consciousness suggestible, is open to some debate. There are two general statements — not to elaborate a theory here, however — which are not done justice to by any of the current theories. We may say, first, that a suggestible consciousness is one in which the ordinary *criteria of belief* are in abeyance; the coefficients of reality, to use the terms of an earlier discussion of belief,[3] are no longer apprehended. Consciousness finds all presentations of equal value, in terms of uncritical reality-feeling. It accordingly responds to them all, each in turn, readily and equally. Second: this state of things is due primarily to a violent reaction or fixation of attention, resulting in its usual monoïdeism, or 'narrowing of consciousness.' For belief is a motor attitude resting upon complexity of presentation and representation. Just as soon as this mature complexity is destroyed, belief

[1] *Handbook of Psychology, Feeling and Will*, pp. 60 ff., and Chap. XII.

[2] See the section below in this chapter (§ 7) in which the main facts of hypnosis are briefly stated, and the further references to the theory of hypnotism in § 3 of the chapter on Volition, below.

[3] *Handbook*, II., Chap. VII.

disappears, and all ideas 'become free and equal' in doing their executive work. Each presentation streams out in action by suggestion; and stands itself fully in the possession of consciousness, with none of the pros and cons of its usual claim to be accepted as real, gaining also the still greater establishment which comes from the return wave upon itself of its own motor discharge. The question of suggestion becomes then that of the mechanism of attention in working three results: (1) the narrowing of consciousness upon the suggested idea, (2) the consequent narrowing of the motor impulses to simpler lines of discharge, and (3) the consequent inhibition of the discriminating and selective attitude which constitutes belief in reality.

The truth of these general statements is thoroughly confirmed by the observation of children, in whom the general system of adjustments, which constitute the 'worlds of reality' of us adults, are not yet effected. Little children are credulous, in an unreflective sense, even to illusion. Tastes, colours, sensations generally, pains, pleasures, may be suggested to them, as is shown by the instances given in later pages.

It is, however, to the truth of the fundamental fact of normal motor suggestion found in children, that I wish to devote a large part of this chapter; and observations of reactions clearly due to such suggestion, either under natural conditions or by experiment, lead me to distinguish the varying sorts of suggestion mentioned in the following paragraphs, in what I find to be about the order of their appearance in child-life.

§ 2. *Physiological Suggestion*

By 'suggestion' is understood ordinarily ideal or ideomotor suggestion, — the origination from without of a motor reaction, by producing in consciousness the state which is ordinarily antecedent to that reaction; but observation of an infant for the first month or six weeks of its life leads to the conviction that its life is mainly physiological. The vacancy of consciousness as regards anything not immediately given as sensation, principally pleasure and pain, precludes the possibility of *ideal* suggestion as such. The infant at this age has no ideas in the sense of distinct memory images. Its conscious states are largely affective. Accordingly, when the reactions which are purely reflex, and certain random impulsive movements, are excluded, we seem to exhaust the contents of its motor consciousness.

Yet even at this remarkably early s age H. was found to be in a degree receptive of suggestion, — suggestion conveyed by repeated stimulation under uniform conditions. In the first place, the suggestions of sleep began to tell upon her before the end of the first month. Her nurse put her to sleep by laying her face down and patting gently upon the end of her spine. This position itself soon became not only suggestive to the child of sleep, but sometimes necessary to sleep, even when she was laid across the nurse's lap in what seemed to be an uncomfortable position.

This case illustrates what I mean by physiological suggestion. It shows the law of physiological habit as it borders on the conscious. No doubt some such effect would be produced by pure habit apart from consciousness; but, consciousness being present, its nascent indefinite states may be supposed to have a quality of suggestiveness, which works to increase the fixedness of the habit. Yet the fact of such a colouring of consciousness in connection with the growth of physiological habit is important rather as a transition to more evident suggestion.

The same kind of phenomena appear also in adult life.

Positions given to the limbs of a sleeper lead to movements ordinarily associated with these positions. The sleeper defends himself, withdraws himself from cold, etc. Children learn gradually the reactions upon conditions of position, lack of support, etc., of the body, necessary to keep from falling out of bed, which adults have so perfectly. All secondary automatic reactions may be classed here, the sensations coming from one reaction, as in walking, being suggestions to the next movement, unconsciously acted upon. The state of consciousness at any stage in the chain of movements, if present at all, must be similar to the baby's in the case above, — a mere internal glimmering, whose reproduction, however brought about, reinforces its appropriate reaction.

The most we can say of such physiological suggestion is, that the conscious state is always present, and that the ordinary reflexes may be subsequently abbreviated and modified.

Professor Ribot says as much as this. "When a physiological state has become a state of consciousness, through this very fact it has acquired a particular character. . . . It has become a new factor in the psychic life of the individual — a result that can serve as a starting-point to some new (either conscious or unconscious) work." And again: "Volition is a state of consciousness . . . it marks a series, *i.e.* the possibility of being recommenced, modified, prevented. Nothing similar exists in regard to automatic acts that are not accompanied by consciousness. . . . Each state of consciousness . . . in relation to the future development of the individual, is a factor of the first order." [1] Schneider,

[1] *Diseases of Personality*, pp. 15–16. Ribot in his text, however, notes mainly the phylogenetic advantage of consciousness as memory, on which see below, Chap. IX., § 3, and Chap. X., §§ 2, 4.

also, writing from the phylogenetic point of view, says: "All purely physiological movements serve a single definite purpose, are always the same; psychological movements, on the contrary, have the peculiarity that they serve *different* purposes, follow upon quite different stimulations, and adapt themselves to circumstances by combination and modification. . . . Otherwise we would not have any consciousness, for there would be no use for it. . . . So in connection with every movement which is accompanied by a phenomenon of consciousness, we may hold, that this phenomenon of consciousness is really necessary (*wirklich nöthig ist*) for the determination of the movement."[1] A more positive pronouncement on the presence of consciousness in all reactions to which the term 'suggestion' may be applied is that of Moll. He says: "*There is no suggestion without consciousness.* It makes no difference whether the suggestion is made through imitation or by a command. . . . I must insist in opposition to Mendel that there is consciousness of what is suggested, and that this is the main point in the matter. A suggestion without consciousness is to me inconceivable."[2]

In hypnotic experimentation, the influence of such subconscious or physiological suggestions is now generally recognized under the general doctrine of hyperæsthesia of the senses. Ochorowicz calls the general phenomenon of suggestion *ideoplasty*,[3] and when no clear idea is necessary to the effect, as in my 'physiological' suggestion, he speaks of 'physical ideoplasty.' He says: "We have *ideoplasty* whenever the thought alone of any functional modification determines such functional modification . . . the thought of yawning itself produces yawning, etc."[4]

[1] *Der thierische Wille*, p. 53. [2] *Hypnotism*, p. 267 (italics his).

[3] Ochorowicz, *Mental Suggestion*, p. 25. (So the translator; 'idioplasy' is perhaps better.) [4] *Ibid.* 354–5.

A particular observation made upon my child E. during her second year may serve to make clear this first stage of suggestion. She learned to go to sleep sucking her bottle, the rubber of which was left in her mouth while she slept. Now, at any sound, touch, or other sudden stimulation, such as the flaring up of the light, she began with more or less vigour to suck the bottle, giving no other sign of awaking whatever, and really not awaking, but only passing from a deeper sleep, or less consciousness, to a lighter sleep, or more consciousness. Now, as I interpret it, the stimulus, arousing more brain process, heightened the sleep or dream consciousness, brought out the sensations in the lips about the rubber, and these sensations by *physiological suggestion* set up the sucking movements. These movements in turn had their habitual influence in sending the child off into deep sleep again. Then, later, it is probable that even the lip sensations were not necessary; but the increased dynamogeny of the increased sensory consciousness simply poured itself into the lip-movement channels, since they were associated last and always with the conditions of sleep.

Liébault was brought to recognize this phenomenon by the possibility of suggesting purely physical functions successfully to very young children.[1]

We may adopt a diagrammatic representation of the elements of a motor reaction at this point for convenience, calling it the 'motor square.' Figure IX. presents a square of which each corner represents a physiological process, as it may occur with or without consciousness, as follows: —

Let *sg* = suggestion (sensory process); *mp* = seat of motor process; *mt* = movement of muscle; *mc* = consciousness of movement (kinæsthetic process). The sides of the square

[1] See illustrative cases given in earlier editions of the work, pp. 113 f., and also in Ochorowicz, *loc. cit.*, p. 247 (with his context).

are connections between the seats of these processes. The relation of the elements of the 'motor square' to other cere-

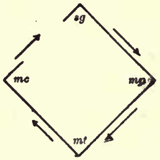


FIG. IX. — 'MOTOR SQUARE.'

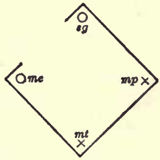


FIG. X. — PHYSIOLOGICAL SUGGESTION.

bral elements, and the relation of this scheme to others proposed by Lichtheim, Kussmaul, etc., are spoken of later.[1]

The stimulus *sg* (Fig. X., in which crosses at the corners indicate nervous processes only, and circles indicate vague states of consciousness) starts the motor process *mp;* it leads to movement, *mt*, which is reported to consciousness, *mc*. The line between *sg* and *mc* is broken, because at this stage in infancy, associations are only just beginning to be formed between a feeling of muscular movement and its stimulating sensation.

The cases of 'physiological suggestion,' as now described,[2] tend, inasmuch as they involve elements of consciousness, to take more definite form, as 'sensori-motor suggestions,' to which we may now turn.

§ 3. *Sensori-motor Suggestion*

These cases of suggestion may again be best illustrated from the phenomena of infancy, before a close definition is attempted. And first we may note some instances of what may be called *general suggestions* of this sort.

[1] Below, Chap. XIII., § 3.

[2] Among confirmatory observations sent me, those of A. G. Parrott, of Farmington, Conn., are varied and careful.

I. *General. — Various Sleep Suggestions.* — From the first month on, there was a deepening of the hold upon the child H. of the early method of inducing sleep. The nurse, in the meantime, added two nursery rhymes. Thus position, pats, and rhyme sounds were the suggesting stimuli. Not until the third month, however, was there any difference noticed when the same suggestions came from other persons. I myself learned, during the fourth month, to put her to sleep, and learned with great difficulty, though pursuing the nurse's method as nearly as possible. Here, therefore, was a sleep suggestion from the *personality* of the nurse, — her peculiar voice, touch, etc., — of which mention is made more fully below. At this time I assumed exclusive charge of putting H. to sleep, in order to observe the phenomena more closely. For a month or six weeks I made regular improvement, reducing the time required from three-quarters of an hour to half an hour, finding it easier at night than at midday. This indicated that darkness had already become an additional sleep suggestion, probably because it shut out the whole class of sensations from sight, thus reducing the attention to stimulations which were monotonous.[1]

In the following month (sixth), I reduced the time required, day or night, to about a quarter of an hour, on an average. In this way I found it possible to send her off to sleep at any hour of the night that she might wake and cry out.

[1] I found by accident, in this connection, the curious fact that a single flash of bright light would often put H. immediately to sleep when all other processes were futile. In her fifth month I despaired one evening, after nearly an hour's vain effort, and lighted the gas at a brilliant flash unintentionally. She closed her eyes by the usual reflex, and did not open them again, sleeping soundly and long. I afterwards resorted to this method on several occasions, carefully shielding her eyes from the direct light rays, and it generally, but not always, succeeded. Shortly after reporting this in the columns of *Science* (Feb. 27, 1891), I heard from a prominent psychologist that his wife could confirm the observation from experience with her own children.

I then determined to omit the patting, and endeavour to bring on sleep by singing only. The time was at first lengthened, then greatly shortened. I now found it possible (sixth to seventh month) to put her to sleep, when she waked in the dark, by a simple refrain repeated monotonously two or three times. In the meantime she was developing active attention, and resisted all endeavours of her nurse and mother, who had been separated from her through illness, very stubbornly for hours, while she would go to sleep for myself, even when most restless, in from fifteen to thirty minutes. This result required sometimes firm holding down of the infant and a determined expression of countenance.

At the end of the year, this treatment being regular, she would voluntarily throw herself in the old position at a single word from me, and go to sleep, if only patted uniformly, in from four to ten minutes. This continued through the second year; even when she was so restless that her nurse was unable to keep her from gaining her feet, and when she screamed if forced by her to lie down. The sight of myself was sufficient to make her quiet; and in five minutes, rarely more, she was sound asleep. I found it of service, when she was teething and in pain, to be able thus to give her quiet, healthful sleep.

This illustrates, I think, as conclusively as could be desired, the passage of purely physiological over into sensory suggestion; and this is all that I care, in this connection, to emphasize.

Food and Clothing Suggestion. — H. gave unmistakable signs of response to the sight of her food-bottle as early, at least, as the fourth month, probably a fortnight earlier. The reactions were a kind of general movement toward the bottle, especially with the hands, a brightening of the face, and crowing sounds. It is curious that the rubber on the bottle seemed to be the point of identification, the bottle being generally not responded to when the rubber was removed. This was also true of E., to whom the rubber alone without the bottle became a remarkable quieting agent, as I have already mentioned. The sight of the bottle, also, was suggestive much earlier than the touch of it with her hands.

H. began to show a vague sense of the use of her articles of clothing about the fifth month, responding at the proper time, when being clothed, by ducking her head, extending her hand or withdrawing it. About this time she also showed signs of joy at the appearance of her mittens, hood, and cloak, before going out.

II. *Suggestions of Personality.* — It was a poet, no doubt, who first informed us that the infant inherits a peculiar sensibility for its mother's face, — a readiness to answer it with a smile. This is all poetic fancy. It is true that the infant does smile very early; E. clearly smiled at me on her seventh day and at her mother on the ninth. But it is probably a purely reflex indication of agreeable organic sensation. When the child does begin to show partiality for mother or nurse, it is because the kind treatment it has already experienced in connection with the face has already brought out the same smile before in this organic way; the mother's face, that is, grows to suggest the smile. At first it is not the face alone, but the personality, the *presence*, to which the child responds; and of more special suggestion, the voice is first effectual, then touch, as in the case of sleep above, and then sight. Such suggestions are among the most important of infancy, serving as elements in the growth of the consciousness of self and of external reality, as we shall have occasion to see later on.

Delaying for the moment the further analysis of this remarkable class of suggestions, the question occurs, are not these so-called 'suggestions' simply cases of the association of ideas? I think we are warranted in answering, 'No'; for the reason that it is not an associated idea that is brought up; unless we are prepared to enlarge the ordinary conception of association to include phenomena of the vaguest psychological meaning. The muscular movement is produced without the production of an idea of that movement, largely through native pathways of discharge, or by the production of organic conditions, such as sleep, which involve muscular conditions. Can we say that the sleep suggestions first bring up an idea or image of the sleep condition, or that the bottle brings up an idea of the movements of grasping, or even of the sweet taste? I think the case is more direct. The energy of stimulation passes over into the motor reaction through the medium of the conscious state; although the conscious state is undoubtedly enveloped in an envelope or fringe of organic and muscular sensation which is of marked hedonic quality. Further, as will appear clearer below, it is not an association plus a suggestion, or an association plus an association, as current atomistic doctrines of association would lead us to expect. We cannot say that pleasure or pain always intervenes between the present state of consciousness and the motor reaction, *i.e.* mother's face, pleasure recalled, expression of pleasure, or present bottle, sweet taste, movements to reach. I believe all this is quite artificial and unnatural. The most that can be said is that the conscious state as a whole, with its hedonic colouring, serves to bring about a modification of the reaction, whether it be a native one, or one established by association or habit.[1]

The elements are as before for physiological suggestion, except that the reaction begins with a clearly conscious

[1] Ochorowicz describes the same class of phenomena as 'ideorganic associations based on habitude,' *Mental Suggestion*, p. 232.

process at *sg* (Fig. XI.), and the child is getting associations between *sg* and *mc*.

The phenomenon of 'personality-suggestion,' to which we may now return, is so important in the growth of the child's consciousness of himself, of his belief in realities about him, and of his social life, that it should be closely scrutinized. This is the more important because such an analysis has never been made upon the basis of actual observation of children. The treatment which follows is based upon most

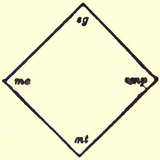


FIG. XI.—SENSORI-MOTOR SUGGESTION

detailed and watchful inspection of H. and E., together with careful but less intimate observation of two other young children, one of them a boy, with especial reference to the development of the sense of their own relation to the persons who moved about them.[1]

As outcome of this kind of observation, and with no intermixture of interpretation, which may be now left over, I find no less than four phases of attitude involved in what afterwards becomes the so-called 'social sense' in the child. I say 'afterwards becomes,' because all of them belong in the 'projective'[2] stage of the child's sense of self, *i.e.* they all go to furnish data which he afterwards appropriates to himself as 'subject.' These four phases are indescribably subtle

[1] Some observations on the presence of something similar to this class of suggestions in animals have already been given above, Chap. I., § 3.

[2] See above, Chap. I., § 3.

and indescribably intermixed in the subjective *ensemble* of the growing child. So much so that I shall not attempt in all cases to cite actual situations to justify each point: rather, the view I take rests upon innumerable situations, and their differences from one another. Just as one is utterly unable to give examples of his own phases of attitude expressive of the *nuances* of meaning which the actions of others bring out of him, so entirely a matter of insight and intuition must his sense be of what is in the child's mind in the various social situations which confront him from day to day. Nevertheless, the drift of the infant's development is very clear to the sympathetic observer; and I think the instances which I cite will be sufficient to excite in all those familiar with little children a sense of the truth of the general portrayal.

1. The first thing in the environment of the infant which it notes — apart from the ordinary fixed and static stimulations, such as sounds, lights, etc. — are *movements*. The first attempts of the infant at anything like steady attention are directed to moving things — a swaying curtain, a moving light, a stroking touch, etc. And further than this, the moving things soon become more than objects of curiosity; these things are just the things that affect him for pleasure or pain. It is movement that brings him his food, movement that regulates the stages of his bath, movement that dresses him comfortably, movement that sings to him and rocks him to sleep. In that complex of sensations, the nurse, the feature of moment to him, of immediate satisfaction, or redemption from pain, is this: movements come to succour him. Change in his bodily feeling is the vital requirement of his life, for by it the rhythm of his vegetative existence is secured; and these changes are accompanied and secured always in the moving presence of the one he sees and feels about him. This, I take it, is the first and great association

of the infant with other persons, the earliest reflection in his consciousness of the world of personalities about him. At this stage his 'personality-suggestion' is this *pain-movement-pleasure* psychosis: to this he reacts with a smile, and a crow, and a kick.[1]

Many facts tend to bear us out in this position. My child cried when I handled her in the dark, although I imitated the nurse's movements as closely as possible. She tolerated a strange presence as long as it remained quietly in its place: but let it move, and especially let it usurp any of the pieces of movement-business of the nurse or mother, and her protests were emphatic. The movements tended to bring the strange elements of a new face into the vital association, pain-movement-pleasure, and so to disturb its familiar course: this constituted it a strange 'personality.'

It is astonishing, also, what new accidental elements may become parts of this association. Part of a movement, a gesture, a peculiar habit of the nurse, may become sufficient to give assurance of the welcome presence and the pleasures which the presence brings. Two notes of my song in the night stood for my presence to H., and no song from any one else could replace it. A lighted match stopped the crying of E. for food,[2] although it was but a signal for a process of food-preparation lasting several minutes: and a simple light never stopped her crying under any other circumstances. So with this first start in the sense of personality we find also reasons for the differences of different personalities; but this constitutes the next phase.

2. It is evident that the sense of another's presence thus

[1] Undoubtedly this association gets some of its value from the other similar one in which the movements are the infant's own. It is by movement that he gets rid of pain and secures pleasure.

[2] Observations made in her fourteenth week.

felt in the infant's consciousness rests, as all associations rest, upon *regularity* or repetition: his sense of expectancy is aroused whenever the chain of events is started. And this is embodied at this stage largely in two indications: the face and the voice.[1] But it is easy to see that this is a very meagre sense of personality; a moving machine which brought pain and alleviated suffering would serve as well. So the child begins to learn in addition the fact that persons are in a measure individual in their treatment of him, and hence that personality has elements of uncertainty or *irregularity* about it. This growing sense is very clear to one who watches an infant in its second half-year. Sometimes its mother gives a biscuit, but sometimes she does not. Sometimes the father smiles and tosses the child; sometimes he does not. And the child looks for signs of these varying moods and methods of treatment. Its new pains of disappointment arise directly on the basis of that former sense of regular personal presence upon which its expectancy went forth.

This new element of the child's 'social sense' becomes, at one period of its development, quite the controlling element. Its action in the presence of the persons of the household becomes hesitating and watchful. Especially does it watch the face for any expressive indications of what treatment is to be expected; for facial expression is now the most regular as well as the most delicate indication. It is unable to anticipate the treatment in detail, and it has not of course learned any principles of interpretation of the conduct of mother or father lying deeper than the details. It is just here, I think, that imitation arises, as will appear later,[2] and becomes so

[1] I have special observations on H.'s responses to changes in facial expression up to the age of twenty months. Her changes of attitude indicated most subtle sensibility to these differences — and normal children all do, I think. Animals show the same remarkable 'projective intuition,' if the expression be allowed.

[2] Below, Chap. XI., § 3.

important in the child's life. This is imitation's opportunity. The infant waits to see how others act, because its own weal and woe depends upon this 'how'; and inasmuch as it knows not what to anticipate, its mind is open to every suggestion of movement. Its attention dwells upon details, and by the regular principle of motor reaction which imitation expresses, it acts these suggestions out.

All through the child's second year, and longer, his sense of the persons around him is in this stage. The incessant 'why?' with which he greets any action affecting him, or any information given him, is witness to the simple puzzle of the apparent capriciousness of persons. Of course he cannot understand 'why': so the simple fact to him is that mamma will or won't, he knows not beforehand which.

But in all this period there is germinating in his consciousness — and this very uncertainty is an important element of it — the seed of a far-reaching thought. His sense of persons — moving, pleasure-or-pain-giving, uncertain but self-directing, persons — is now to become a sense of *agency*, of power, which is yet not the power of the regular-moving door on its hinges or the rhythmic swinging of the pendulum of the clock. The sense of personal actuation, 'projective agency,' is now forming, and it again is potent for still further development of the social consciousness. For he begins to grow capricious himself, and to feel that he can be so whenever he likes. Suggestion begins to lose the regularity of its working; or to become negative and 'contrary' in its effects. At this period it is that obedience begins to grow hard, and its meaning begins to dawn upon the child as the great reality. It means the subjection of his own agency, his own liberty to be capricious, to the agency and liberty of some one else.

3. With all this, the child's distinction between and among

the persons who constantly come into contact with him grows on apace, in spite of the element of irregularity of the general fact of personality. As before he learned the difference between one presence and another, — a difference which was overcome in the discovery that every presence is of irregular value; so now he learns the difference between one *character* and another — the regularity of personal agency, as opposed to the regularity of mere associations of movement and to the irregularity of the apparently capricious. Every character is more or less regular in its irregularity. It has its tastes and modes of action, its temperament and type of command. This the child learns late in the second year and thereafter. He behaves differently when the father is in the room. He is quick to obey one person, slow to obey another. He cries aloud, pulls his companions, and behaves reprehensibly generally, when no adult is present but his nurse, who has no authority to punish him. This stage in his 'knowledge of man' leads to those active differences of conduct on his part which make imitation, and the discipline of obedience, a sword with two edges, one for good and one for evil. This general appreciation of character, together with the full-blown social feeling, which constitutes the fourth phase in my division, may be left for later discussion, as well as the part played by this kind of suggestion in the genesis of the moral sense.[1]

To sum up: 'personality-suggestion' is the general term for the stimulations to activity which the child gets from persons. It develops through three or four roughly distinguished 'stages,' all of which illustrate what I have called his 'projective' sense of personality; namely, 1. a bare distinction, on the ground of peculiar pain-movement-pleasure complexes, *of persons from things;* 2. a sense of the irregu-

[1] Below, Chap. XI., § 3.

larity or capriciousness of the behaviour of these persons, which is the germ of his *sense of agency*, as opposed to the regular causal series of conditions which things go through; 3. his distinction, vaguely felt but reacted to with great exactness, between the characteristic modes of behaviour or *personal character* of different persons; 4. after his sense of his own subject-agency arises by a process of imitation, he gets what is really *social feeling:* the sense of others as 'ejective,' that is, as like and equal to himself.[1]

III. *Deliberative Suggestion.* — By 'deliberative suggestion' I mean a state of mind in which co-ordinate sense-stimuli meet, confront, oppose, further, one another. Yet I do not mean 'deliberation' in the full-blown volitional sense, but *suggestion* that appears deliberative, while still inside the reactive consciousness and still representing a single reaction upon a single state of consciousness. In real deliberation, as appears below, there are two or more pictured alternatives, upon the conscious co-ordination of which action follows. But here the different elements are ingredients in a single sensory complex, — one suggestion, — and the motor reaction waits upon the issue of the whole. The competition of processes is probably in large measure subcortical. So the state is still to be classed as sensori-motor, not ideo-motor, since it does not require intelligent memory and representation. The last three months of the child's first year are, I

[1] The reader may notice in this connection the section below on 'bashfulness,' which is found to be a native organic response to the presence of persons, considered as 'projects' of a personal kind. It is curious to note that besides general gregariousness which many animals show in common, they have in many instances special sense indications of the presence of creatures of their own kind or of other kinds. Dogs and cats each recognize both dogs and cats by *smell*. Horses seem to be guided by *sight*. Fowls are notoriously blind to shapes of fowls, but depend on the cries which they *hear* of their kind or their young. Experiments seem to show that many of these responses are probably not congenital. (See Morgan, *Habit and Instinct*.)

think, clearly given over to this kind of consciousness. Motor stimulations have multiplied, the emotional life is budding forth in a variety of promising traits, the material of conscious character is present; but the 'ribs' of mental structure may still be seen through, response answering to appeal in a complex but yet mechanical way. The child lacks self-consciousness, self-decision, self in any developed form.

As an illustration of what I mean, I may record the following case of deliberative suggestion from H.'s thirteenth month: it was more instructive to me than whole books would be on the theory of the conflict of impulses. When about eight months old, H. formed the peculiar habit of suddenly scratching the face of her nurse or mother with her nails. It became fixed in her memory, probably because of the unusual facial expression of pain, reproof, etc., which followed it, until the close proximity of any one's face was sufficient suggestion to her to give it a violent scratch. In order to break up this habit, I began to punish her by taking at once the hand with which she scratched and 'snapping' her fingers with my own first finger hard enough to be painful. For about four weeks this seemed to have no effect, probably because I only saw her a small part of the time, and only then did she suffer the punishment. But I then observed, and those who were with her most reported, that she only scratched once at a time, and grew very solemn and quiet for some moments afterwards, as if thinking deeply; and soon after this climax was reached she would scratch once impulsively, be punished, and weep profusely, then become as grave as a deacon, looking me in the face. I would then deliberately put my cheek very close to her, and she would sit gazing at it in 'deep thought' for two or even three minutes, hardly moving a muscle the whole time, and then either suddenly scratch my face and be punished again, or turn to something (noise, object, watch-chain, etc.) which I was careful enough to provide in order to aid her by drawing off the attention. Having scratched, she began to cry, in anticipation of the punishment. Gradually the scratching became more rare. She seldom yielded to the temptation after being punished, and so the habit entirely disappeared. I may add that her mother and myself endeavoured to induce a different reaction by taking the child's other hand and with it stroking the face which she had scratched. This movement in time replaced the other completely, and the soft stroking became one of her most spontaneous expressions of affection.[1]

Now the first act of scratching was probably accidental, one of the spontaneous reactions or physiological suggestions so common with an infant's hands; it passed, by reason of its peculiar associations, into a sensori-motor reaction whenever the presence of a face acted as suggestion, — so far a strong direct stimulus to the motor centres. Then came the pain of punishment, — a stimulus to the inhibition on the next occasion, not by exciting a clear memory, but by working itself directly into the suggesting psychosis, and thus reducing the motor tendency. For a time the tendency remained strong enough, however, to cause the reaction; then there followed an apparent balance between the two, and finally the pain element predominated in the suggestion, and the reaction was permanently inhibited. The stroking reaction gained all the strength of violent and repeated association with the elements of this mental conflict, and was thus soon fixed and permanent.

Taking this as a typical case of 'deliberative suggestion,' — and I could instance many others from H.'s life history

[1] A somewhat similar action by a boy of nine months has been reported to me by Rev. C. H. Huestis of Barrington, Nova Scotia.

and from E.'s, — two inferences may be brought out in passing: *there is nothing here that requires volition*, meaning by 'volition' a new influence of any kind, — active consciousness; if we do call it so, we simply apply a different term to phenomena which in their simplicity we call by other names. And, second, *suggestion is as original a motor stimulus as pleasure and pain.* Here they are in direct conflict. Can we say that H. balanced the pleasure of scratching and the pain of punishment, and decided the case on this egoistic basis? What pleasure did the scratching have more than any other muscular exercise? It was simply a sensori-motor habit which the pain inhibition tended to break up.

So also, apart from pathological *aboulia*, which is described later on, we find a corresponding condition in adult life. As I have said elsewhere, "there is a state of conflict and hindrance among presentations which is mechanical in its issue, . . . so states of vexation, divided counsel, conflicting impulse, and hasty decision against one's desire for deliberate choice. We often find ourselves drawn violently apart, precipitated through a whirl of suggested courses into a course which we feel unwilling to acknowledge as our own."[1] Many of the conditions of deliberation are there, but not the fact of it.

§ 4. *Ideo-motor Suggestion*

By ideo-motor suggestion I mean the condition in which the stimulus is a clearly pictured idea, a presentation or object with all its 'meaning,' or a revived image of memory or imagination.

[1] *Handbook*, II., p. 299. This kind of complex suggestion, however, undoubtedly serves to give a ready organic basis for the earlier and more obscure acts of volition, which are described later on (Chap. XIII., § 4).

Imitation.[1] — For a long period after the child has learned to use all his senses, and after his memory is well developed, he lacks conscious imitation entirely. I have been quite unable with my children to confirm the results of Preyer, who attributes imitation to his child at the age of three to four months.

In support of the assertion that imitation is rather late in its rise, the following experiences may be reported. As a necessary caution, the rule was made that no single performance should be considered real imitation unless it could be brought out again under similar circumstances. This rule is necessary, I think, merely for caution, since the 'copy' set for imitation is likely to be some simple movement of lips, hands, etc., which the child has made himself before, and is likely to make again. It is possible also from the mere fact of dynamogeny that the motor discharge in shedding itself outward would tend in a general way to find its most permeable native pathway toward the muscles which repeat the copy, since the movements are natural and easy. At any rate, such cases, if they exist, shade up gradually into conscious imitations.[2]

It is probable, therefore, that cases of imitation recorded as happening as early as the third month are merely coincidences. For example, I recorded an apparent imitation by H., of closing the hand, as late as May 22 (beginning of the ninth month), but afterwards I wrote, "experiment not confirmed with repeated trials running through four succeeding days." H.'s first clear imitation was on May 24, in knocking a bunch of keys against a vase, as she saw me do

[1] In this chapter the word 'imitation' is used to denote 'conscious' social imitation — its usual popular sense.

[2] See the remarks on the question of 'instinctive imitation,' below, Chap. XII., § 2.

it, in order to produce the bell-like sound. This she repeated over and over again, and tried to reproduce it a week later, when, from lapse of time, she had partly forgotten how to use the keys. But on the same day, May 24, other efforts to bring out imitation failed signally, *i.e.* with more or less articulate sounds, movements of the lips (Preyer's experiments), and opening and closing of the hands. Ten days later, however, she imitated closing the hand on three different occasions. And a week afterward she imitated movements of the lips and certain sounds, as *pa*, *ma*, etc.[1] From this time forward the phenomenon seemed extended to a very wide range of activities, and began to assume the immense importance which it always comes to have in the life of the young child.

When the imitative impulse does come, it comes in earnest. For many months after its rise it may be called, perhaps, the controlling impulse, apart from the ordinary life processes. As a phenomenon, it is too familiar to need description. Its importance in the growth of the child's mind is largely in connection with the development of language and of voluntary movement generally.

The phenomena may be divided into two general classes, called *simple imitation* and *persistent imitation*.[2] By 'sim-

[1] The majority of recorded observations agree in making vocal imitations later than visual-movement imitations. Egger, *loc. cit.*, p. 8; Tracy, *Psychology of Childhood*, p. 57 (for citations); Stevenson, *Science*, March 3, 1893. The first vocal imitation of my other child, E., was observed in her eleventh month, when she tried to say 'tick,' in reference to the clock, after her mother, together with '*ps*' for 'pussy,' and '*pŏ*' for 'pop.'

[2] This is akin to Preyer's distinction between 'spontaneous' and 'deliberate' imitation. He is wrong in making both classes voluntary. The contrary is proved for spontaneous imitation by the fact that many elements of facial expression are never acquired by blind children. We could hardly say that facial expression was a voluntary acquisition, however gradually it may have been acquired. See Preyer, *Senses and Will*, p. 293.

ple' imitations reactions are characterized, in which the movement does not imitate well, but is the best the child can do. He does not try to improve by making a second attempt. This is evidently a case of simple sensori-motor suggestion, and is peculiar psychologically only because of the more or less remote approximation the reaction has to the model that the child copies.

The reaction at which imitative suggestion aims is one which will *reproduce the stimulating impression*, and so tend to perpetuate itself. When a child strikes the combination required, he is never tired working it. H. found endless delight in putting the rubber on a pencil and off again, each act being a new stimulus to the eye. This is specially noticeable in children's early efforts at speech. They react all wrong when they first attack a new word, but gradually get it moderately well, and then sound it over and over in endless monotony. The essential thing, then, in imitation, over and above simple ideo-motor suggestion, is that *the stimulus starts a motor process which tends to reproduce the stimulus and, through it, the motor process again.* From the physiological side we have a *circular activity* — sensor, motor; sensor, motor: and from the psychological side we have a similar circle — reality, image, movement; reality, image, movement, etc.

The square to the left (Fig. XII.) is the first act of imitation; the movement (*mt*) now stimulates (dotted line *a*) the eye again (*sg'*), giving the second square, which by its movement (*mt'*) furnishes yet another stimulus (dotted line *a'*); and so on.

By 'persistent imitation' is meant the child's effort, by repetition, to improve his imitations. Its extreme importance justifies its separate discussion in a later place.[1]

[1] Chap. XIII., § 2. The general discussion of the position of imitation in the mental life, especially its phylogenetic value, is reserved for later chapters (Chaps. IX.–XIII.).

Surveying the ground that we have gone over so far in this chapter, the progress of suggestion may be seen by the following brief definitions: —

1. *Physiological suggestion* is the tendency of a reflex or secondary automatic process to get itself associated with and influenced by stimulating processes of a physiological

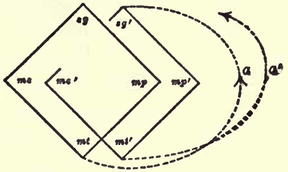


FIG. XII. — IMITATION

and vaguely sensory sort. Perhaps the plainest case of it, on a large scale in animal life, is seen in the decay of instincts when no longer suited to the creature's needs and environment.

2. *Sensori-motor and ideo-motor suggestion* is the tendency of all nervous reactions to adapt themselves to new stimulations, both sensory and ideal, in such a way as to be more ready for the repetition or continuance of these stimulations.

3. *Deliberative suggestion* is the tendency of different competing sensory processes to merge in a single conscious state with a single motor reaction, illustrating the principles of nervous summation and arrest.

4. *Imitative suggestion* is the tendency of a sensory or ideal process to maintain itself by such an adaptation of its discharges that they reinstate in turn new stimulations of the same kind.

Whether any simpler formulation of these partial statements may be reached, is a question which may be delayed until we have looked more closely at certain other instances of suggestion, which have not been described before, and at the conditions of nervous adaptation in general.[1]

§ 5. *Subconscious Adult Suggestion*[2]

There are certain phenomena of a rather striking kind coming under this head whose classification is so evident that discussion of the general psychological principles which they involve is not necessary. The kind of fact which I have in view may be illustrated with sufficient clearness merely by the recital of the following observations.

Tune-suggestion. — Professor Ladd has pointed out in detail — what has for a long time been taken for granted — that dream states are largely indebted for their visual elements, what we see in our dreams, to accidental lines, patches, etc., in the field of vision, when the eyes are shut, due to the distended blood vessels of the cornea and lids, to changes in the external illumination, to the presence of dust particles of different configuration, etc.[3] The other senses also undoubtedly contribute to the texture of our dreams by equally subconscious suggestions. And there is no doubt, further, that our waking life is constantly influenced by equally trivial stimulations.

I have tested in detail, for example, the conditions of the rise of so-called 'internal tunes' — we speak of 'tunes in our heads' or 'in our ears' — and find certain suggestive influences which in most cases cause these tunes to rise and

[1] See Chap. VII. on 'The Theory of Development,' and Chap. IX. on 'Organic Imitation.'

[2] Mr. A. G. Parrott has sent to me confirmation by himself of many of the observations of this section.

[3] Ladd, 'Psychology of Visual Dreams,' in *Mind*, N. S., Vol. I. (1892), p. 299.

take their course. Often, when a tune springs up 'in my head,' the same tune has been lately sung or whistled in my hearing, though quite unconsciously to myself. Often the tunes are those heard in church the previous day or earlier. Such a tune I am entirely unable to recall voluntarily: yet when it comes into my mind's ear, so to speak, I readily recognize it as belonging to an earlier day's experience. Other cases show various accidental suggestions, such as the tune 'Mozart' suggested by the composer's name, the tune 'Gentle Annie' suggested by the name Annie, etc. In all these cases it is only after the tune has taken possession of consciousness, and after much seeking, that the suggesting influence is discovered.

Closer analysis reveals the following facts. The 'time' of such internal tunes is usually dictated by some rhythmical subconscious occurrence. After hearty meals it is always the time of the heart-beat, unless there be 'in the air' some more impressive stimulus; as, for example, when on shipboard, the beat is with me invariably that of the engine throbs. When walking it is the rhythm of the foot-fall. On one occasion a knock of four beats on the door started the Marseillaise in my ear: following up this clue, I found that at any time, different divisions of musical time being struck on the table at will by another person, tunes would spring up and run on, getting their cue from the measures suggested. Further, when a tune dies away, its last notes often suggest, some time after, another having a similar movement — just as we pass from one tune to another in a 'medley.' It may also be noted that in my case the tune memories are *auditive:* they run in my head when I have no words for them and have never sung them — an experience which is consistent with the fact that these 'internal tunes' arise in childhood before the faculty of speech. They also have distinct pitch. For example, on April 9, 1892, I found a tune 'in my head' which was perfectly familiar, but for which I could find no words. Tested on the piano, the pitch was *f*-sharp and the time was my heart-beat. I finally, after much effort, got the unworthy words, 'Wait till the clouds roll by,' by humming the tune over repeatedly. The pitch is determined, probably, by the accidental condition of the auditory centre as respects pitch-readiness, or by the pitch-colouring of the external sound which serves as stimulus to the tune.

Dreams as Emotion Stimulus. — Another important realm of suggestion, not hitherto explored, is seen in the influence of dreams on the waking life. Dreams react to deepen waking impressions, and to strengthen the hold of dominant presentations and impulses. This fact seems to have its primary application to emotion. We cannot tell how much of the active momentum of our waking life we owe to dream stimulation. The following case of fact, in the life of my little girl H., indicates that such a stimulus may be of enormous importance. When two years and three months of age, she was accidentally run over by a dog. Before this she had been very fond of dogs. She was not much hurt, but very much frightened, and repeated to every one the words, 'Doggie run over baby.' The next day she saw a dog on the street and showed some signs of fear until the brute ran away. About the second night after the occurrence her mother and I were awakened by a violent outcry in H.'s room. On going in, the child was found sitting in bed undergoing a paroxysm of fear from a bad dream. She repeated again and again after leaving the room, 'Doggie run over baby ānā' (ānā was her word for *there*), pointing into her bedroom. Evidently she had lived over again in her dream the occurrence with the dog. The effect on her waking life was very marked. The next day she could not be induced to go into her bedroom, protesting, 'Doggie in ānā,' and crying lustily if the endeavour was made to carry her. Further, for several days the sight of a dog on the street threw her into such convulsive fits of fear that her nurse brought her home to be quieted — a much more violent exhibition, be it noted, than that which occurred after the real occurrence with the dog, but before the dream. The sight or even the picture of a dog long excited great emotion, and it is not unlikely that she will carry for life this antipathy, which will appear later to be unaccountable.[1]

Normal Auto-suggestion. — A further class of suggestions, which fall under the general phrase 'auto-suggestion,' of a normal type, may be illustrated. In experimenting upon the possibility of suggesting sleep to another, I have found certain strong reactive influences upon my own mental condition. Such an effort, which involves the picturing of another as asleep, is a strong auto-suggestion of sleep, taking effect in my own case in about five minutes if the conditions be kept constant. The more clearly the patient's sleep is pictured, the stronger becomes the subjective feeling of drowsiness. After about ten minutes the ability to give strong concentration seems to disintegrate, attention is renewed only by fits and starts and in the presence of great mental inertia, and the oncoming of sleep is almost overpowering. A frequent cure for insomnia, speaking for myself, is the persistent effort to put some one else asleep by hard thinking of the end in view, with a continued gentle movement, such as stroking the other with the hand.

On the other hand, it is impossible to bring on a state of drowsiness by imagining myself asleep. The first effort at

[1] Féré cites a case of hysterical paralysis brought on by a dream, *Sensation et Mouvement*, p. 25. See also *Brain*, January, 1887.

this, indeed, is promising, for it leads to a state of restfulness and ease akin to the mental composure which is the usual preliminary to sleep; but it goes no farther. It is succeeded by a state of steady wakefulness, which effort of attention or effort not to attend only intensifies. If the victim of insomnia could only forget that he is thus afflicted, could forget himself altogether, his case would be more hopeful. The contrast between this condition and that already described shows that it is the self-idea, with the emotions it awakens, which prevents the suggestion from realizing itself and probably accounts for many cases of insomnia.[1]

The attempt to analyze out the emotional 'moments' which enter into the latter case yields some such result as the following. It is impossible to think of self, however vaguely and fugitively, without inducing positive emotional excitement. All the intense self-motives which practical life keeps alive — the most vigorous expressive influences of our mental nature — at once tend to spring up from their nascent state. There are really no proper distinctions among them: pride [2] shades down to complacency, complacency merges into mild interest, interest becomes intensified in anxiety or fear. Or the mere thought of self starts a train of affairs through consciousness about which personal concern is lively. When one thinks of himself, a kind of egoistic excitement at once arises. It is undoubtedly these subjective elements, these emotional phases, which prevent such conscious auto-suggestions from realizing themselves.

Sense Exaltation. — Recent hypnotic discussions have shown the remarkable exaltation which the senses may

[1] This is confirmed by the fact that insomnia readily yields to hypnotic suggestion.

[2] A friend informs me that when he pictures himself asleep or dead, he cannot help feeling gratified that he makes so handsome a corpse.

attain in somnambulism, together with a corresponding refinement in the interpretative faculty. Events, etc., quite subconscious, usually become suggestions of direct influence upon the subject. Unintended gestures, habitual with the experimenter, may suffice to hypnotize his accustomed subject. The possibility of such training of the senses in the normal state has not had sufficient emphasis. The young child's subtle discriminations of facial and other personal indications are remarkable. The prolonged experience of putting H. to sleep — extending over a period of more than six months, during which I slept beside her bed — served to make me alive to a certain class of suggestions otherwise quite beyond notice.[1]

In the first place, we may note the intense auto-suggestion of sleep already pointed out, under the stimulus of repeated nursery rhymes regularly resorted to in putting the child asleep. Second, surprising progressive exaltation of hearing and the interpretation of sounds coming from her in a dark room. At the end of four or five months, her movements in bed awoke me or not according as she herself was awake or not. Frequently after awaking I was distinctly aware of what movements of hers had awaked me.[2] A movement of her head by which it was held up from her pillow was readily distinguished from the restless movements of her sleep. It was not so much, therefore, exaltation of hearing as exaltation of the function of the *recognition* of sounds heard and of their *discrimination.*

Again, the same phenomenon to an equally marked degree

[1] It is well known that mothers are awake to the needs of their infants when they are asleep to everything else.

[2] This fact is analogous to our common experience of being awaked by a loud noise and then hearing it after we awake; although the explanation is not the same.

attended the sound of her breathing. It is well enough known that the smallest functional bodily change induces changes in both the rapidity and the quality of the respiration.[1] In sleep the muscles of inhalation and exhalation are relaxed, inhalation becomes long and deep, exhalation short and exhaustive, and the rhythmic intervals of respiration much lengthened. Now degrees of relative wakefulness are indicated with surprising delicacy by the slight respiration-sounds given forth by the sleeper. Professional nurses learn to interpret these indications with great skill. This kind of hearing-exaltation became very pronounced in my operations with my child. After some experience the peculiar breathing of advancing or actual wakefulness in the child was sufficient to wake me. And when awake myself, the change in the infant's respiration-sounds to those indicative of oncoming sleep was sufficient to suggest or bring on sleep in myself. In the dark, also, the general character of her breathing-sounds was interpreted with great accuracy in terms of her varied needs, her comfort or discomfort, etc. The same kind of suggestion from the respiration-sounds now troubles me whenever any one is sleeping within hearing distance.[2]

[1] Cf. Vierordt in *Gerhardt's Handbuch der Kinderkrankheiten*, p. 215.

[2] This is an unpleasant result which I find confirmed by professional infants' nurses. They complain of loss of sleep when off duty. Mrs. James Murray, an infants' nurse in Toronto, informs me that she finds it impossible to sleep when she has no infant in hearing distance, and for that reason she never asks for a vacation. Her normal sleep has evidently come to depend upon continuous soporific suggestions from a child. In another point, also, her experience confirms my observations, viz., the child's movements, preliminary to waking, awake her, when no other movements of the child do so — the consequence being that she is ready for the infant when it gets fully awake and cries out.

I may add that these vague suggestive influences, acting upon the operator, have not been sufficiently weighed in the practice of hypnotism. Ochorowicz

The reactions in movement upon these suggestions are very marked and appropriate, in customary or habitual lines, although the stimulations are quite subconscious. The clearest illustrations in this body of my experiences were afforded by my responses in crude songs to the infant's waking movements and breathing-sounds. I have often waked myself by myself singing one of two nursery rhymes, which by endless repetition night after night had become so automatic as to follow in a reactive way upon the sense-stimulus from the child. It is certainly astonishing that among the things which one may get to do automatically, we find automatic singing: but writers on mental defect have noted that the function of musical or semi-musical expression may be reflex.[1]

The principle of subconscious suggestion, of which these simple facts are less important illustrations, has very interesting applications in the higher reaches of social, moral, and educational theory. I have applied the phrase 'plastic imitation' to certain of the social and educational phenomena.[2]

§ 6. *Inhibitory Suggestion*

An interesting class of phenomena which figure perhaps at all the levels of suggestion now described, may be known as 'inhibitory suggestions.' The phrase, in its broadest use, refers to all cases in which the suggesting stimulus tends to suppress, check, inhibit, movement. We find this in certain

points this out. It is almost impossible for the operator to give suggestions which he has not himself taken in a measure from the patient, or which both he and the patient have not gotten in common from a common psychic atmosphere. There is, I fancy, a good deal of this reciprocal influence in the cases of striking *rapport* between particular operators and patients. Of course I can more easily give effective suggestions to you, if I am myself getting what I suggest in whole or part from you in the first instance.

[1] Cf. Wallaschek, *Zeitsch. für Psychologie*, VI., Hefte 2, 3.

[2] *Mind*, January, 1894; cf. Chap. XII., § 2, below.

cases just as strongly marked as the positive movement-bringing kind of suggestion. The facts may be put under certain heads in relation to the types of suggestion already enumerated, the general theory being left over for the doctrine of mental development found in subsequent chapters.

Pain Suggestion. — Of course, the fact that pain inhibits movement occurs at once to the reader. As far as this is true always, and is a native inherited thing, it is organic, and so falls under the head of 'physiological suggestion' of a negative sort. The child shows contracting movements, crying movements, starting and jumping movements, shortly after birth, and so plainly that we need not hesitate to say that these pain responses are provided for in his nervous system; and that, in general, they are inhibitory and contrary to those other native reactions which indicate pleasure. Our theory provides, as stated below, a way of accounting for this state of things.[1]

The influence of pain, besides being thus a physiological datum, extends everywhere through mental development. It is one of our main objects to try to ascertain its exact function, both in individual and in race development; so any further word upon it here would only anticipate later detailed treatment. The general fact, however, is this: that pain suggests a lively muscular revolt away from every stimulus which produces it; and this statement includes, of course, the inhibition of any movement which brings pain, since this movement is itself felt as a stimulating or incoming process along those afferent nerve courses which serve as the apparatus of the muscular sense.

Control Suggestion. — This covers all cases which show any kind of restraint set upon the movements of the body short of that which comes from voluntary intention. The

[1] See especially, Chap. VII. and Chap. XVI., § 2.

infant brings the movements of his legs, arms, head, etc., gradually into some kind of order and system. This is accomplished by a system of organic checks and counter-checks, by which associations are formed between muscular sensations and certain other sensations, as of sight, touch, hearing, etc. The latter serve as suggestions to the performance of those movements, and those *only*, which produce the former. The infant learns to hold up his head, to raise his trunk, to extend his hands, to grasp with thumb opposite the four fingers — all purely by such control suggestions. These cases come so near to the sphere of voluntary action — indeed, they pass so directly into volitions — that they are more profitably discussed in the chapter devoted to that topic. We will there see reasons for rejecting the view of some, that these are voluntary acts on the part of the child. The few new observations which I have to offer on this topic may also be reserved.

Contrary Suggestion. — By this is meant a tendency of a very singular kind observable in many children, no less than in many adults, to do the contrary when any course is suggested. The very word 'contrary' is used in popular talk to describe an individual who shows this type of conduct. Such a child or man is rebellious whenever rebellion is possible; he seems to kick constitutionally against the pricks. My child E. showed it in her second year in a very marked way. When told that a new taste was 'good' — a suggestion readily taken in its positive sense by her sister at that age — she would turn away with a show of distaste even when she had liked the same taste earlier. When asked to give her hand into mine, — a case of direct imitative suggestion, — she thrust it behind her back. The sight of hat and cloak was a signal for a tempest, although she enjoyed outdoor excursions. These are only instances from many of her contrary suggestions at this period. The tendency yielded to the all-conquering onset of imitation late in her second year, and she is now (third year) as docile an imitator as one could desire.

The fact of 'contrariness' in older children — especially boys — is so familiar to all who have observed school children with any care, that I need not cite further details. And men and women often become so enslaved to suggestions of contrary that they seem only to wait for indications of the wishes of others in order to oppose and thwart them.

Contrary suggestions are to be explained as exaggerated instances of control. It is easy to see that the checks and counter-checks already spoken of as constituting the method of suggestive control of movement — that these may themselves become so habitual and intense as to dominate the reactions which they should only regulate. The associations between the muscular series and the visual series, let us say, which controls it, comes to work backwards, so that the drift of the organic processes is toward certain contrary reverse movements. Certain of the other associates of the control series also, especially those which, by strong contrasting experiences of pleasure and pain, represent in any sense a contrary series, may become dominating. While in the case of simple movements, as I have said, the dominant associates are only the same motor and visual series read backwards; yet the range of contrast effects secured by association extends to all cases of opposing systems of movement and suggestions of conduct. So contrary suggestion becomes clear as a case of auto-suggestion in which the stimulating sensation or thought is itself started up in sharp contrast and habitual opposition to a present external suggestion of the regular kind.

In the higher reaches of conduct and life we find interesting cases of very refined contrary suggestion. In the man of ascetic temperament, the duty of self-denial takes the form of a regular contrary suggestion in opposition to every invitation to self-indulgence, however innocent. And the over-scrupulous mind, like the over-precise, is a prey to the eternal remonstrances from the contrary which intrude their advice into all his decisions. In matters of thought and belief, also, cases are common of stubborn opposition to evidence, and persistence in opinion, which are in no way due to the cogency of the contrary argument, or to real force of conviction.

Bashfulness. — I may first report observations on this interesting fact of child-life, considered as an exhibition of what has been called 'inhibitory suggestion'; and then show its bearings.

The general character of a child's bashfulness need not be enlarged upon. Its form of expression is also familiar. It begins to appear generally in the first year, showing itself as an inhibiting influence upon the child's normal activities. Its most evident signs are nervous fingerings of dress, objects, hands, etc., turning away of head and body, bowing of head and hiding of face, awkward movements of trunk and legs, and in extreme cases, reddening of the face, puckering of lips and eye muscles, and finally cries and weeping. An important difference, however, is observable in these exhibitions according as the child is accompanied by a familiar person or not. When the mother or nurse is present, many of the signs seem to be useful in securing concealment from the eye of strangers — behind dress or apron or figure of the familiar person. In the absence, however, of such a refuge the child sinks often into a state of general passivity or inhibition of movement, akin to the sort of paralysis usually associated with great fear.

This analogy with the physical signs of fear gives a real indication, I think, of the race origin of bashfulness, which is probably a differentiation of fear. This I cannot dwell upon now, but simply suggest that bashfulness arose as a special utility-reaction on occasion of fear of persons, in view of personal qualities possessed by the one who fears. The concealing tendency also shows the parallel development of intimate personal relationships of protection, support, etc., and so gives indications of certain early social conditions.

My observations of bashfulness — not to dwell upon descriptions which have been made before by others — serve to throw the illustrations of it into certain periods or epochs which I may briefly characterize in order.

1. The child is earliest seized with what may be called 'primary' or 'organic' bashfulness akin to the organic stages in the well-recognized instinctive emotions, such as fear, anger, sympathy, etc.[1] This exhibition occurs in the first year and marks the attitudes of the infant toward strangers. It is not so much inhibitory of action in this first stage; it rather takes on the positive signs of fear, with protestation, shrinking, crying, etc. It falls easily under the type of reaction described as 'sensori-motor suggestion,' above; being very largely provided for in the nervous equipment of the child at this age.

The duration of this stage depends largely upon the child's social environment. The passage from the attitude of instinctive antipathy toward outsiders, and that of affection equally instinctive toward the members of the household, over into a more reasonable sense of the difference between proved friends and unproved strangers — this depends directly upon the growth of the sense of general social relationships es-

[1] On which last see Chap. XI., § 3, below, and cf. my *Handbook of Psychology*, II., Chap. VIII., § 7.

tablished by experience.[1] One of the most important elements in the child's progress, in this way, out of its 'organic' social life, is the degree and variety of its intercourse with other children, and indeed also with other adults, than those of its own home. Children carried to summer hotels every year, or brought frequently into the drawing-room to see the mothers' callers, soon lose all 'fear of strangers' and become quite frankly approachable, even showing great liking for society at the tender age of a year and a half or so. On the other hand, children kept in extreme isolation from strangers, young or old, may show extraordinary paralysis of all motor functions, of a markedly organic kind, steadily for two or three years later on in their development, when brought suddenly into the presence of those who are unfamiliar.[2]

The rapidity with which a child gets over its organic bashfulness varies also remarkably with the attitudes of older children whom he sees. Nothing else cures a child of this physical shyness as quickly as the example of an older child. This is also one of the marked offices of imitation. It presents to the imitative child an example or 'copy,' which tends to bring out his action in definite ways earlier than his own organic growth would in itself have warranted. The child by instinct imitates movements, etc., which he would otherwise have waited to acquire largely by accident. In this way the stages of social growth are very materially shortened.

2. I find next a period of strong social tendency in the child, of toleration of strangers and liking for persons generally, in great contrast to the attitudes of organic distrust of the earlier period just mentioned. There seems to be in this a reaction

[1] The experience, *i.e.*, largely got through imitation and its clarifying influence upon the sense of self in the child; see below, Chap. XI., § 3.

[2] See the remarks on such 'isolation,' in reference to the development of personality, in my short article in the *Century Magazine*, December, 1894, repeated in substance below, Chap. XII., § 3.

against the instinct of social self-preservation characteristic of the earlier stage. It is due in all likelihood to the actual experience of the child in receiving kind treatment from strangers — kinder in the way of indiscriminate indulgence than the more orderly treatment which it gets from its own parents. Everybody comes to be trusted on first acquaintance by the child, through the teachings of his own experience, just as in the earlier years everybody was treated by him, under the instincts of his inherited nature, as an agent of possible harm.

That this new phase of social attitude is learned from experience is seen in the absence of this confidence, on the part of the child, toward animals. The fear, purely of the organic stage, persists in the child's thoughts of animals which are new to him, and only becomes more confirmed as he fails to get the same reasons for 'modifying his opinion' that teach him to tolerate strange persons more and more comfortably. The contrast is strongly brought out sometimes when such a young child meets animals in public places. He then turns to persons for protection, even to the strange persons before whom, under ordinary circumstances, he would stand abashed. His native sense of social protection, at first limited to his natural protectors in his own house, has come to extend to all persons, as against such common enemies as the brutes. Later on, as we know, the domestic animals get taken over, also, from the one class into the other.

3. Finally I note the return of bashfulness in the child's third year and later. This time it is bashfulness in the proper sense of the term, rid of the element of fear, and rid, largely, of its compelling organic force and methods of expression. The bashful five-year-old smiles in the midst of his hesitations, draws near to the object of his curiosity, is evidently overwhelmed with the sense of his own presence

rather than with that of his new acquaintance, and indulges in actions calculated to *keep notice drawn to himself.*

The reality of this group of the child's social attitudes, and the great contrast which they present to those of the organic period, can hardly have too much emphasis. It is one of the great outstanding facts of his progressive relation to the elements of his social *milieu*. There is a sort of self-exhibition, almost of coquetry, in the child's behaviour; which shows the most remarkable commingling of native organic elements with the social lessons of personal well- and ill-desert which are now becoming of such importance in his life. All this makes so marked a contrast to the exhibitions of organic bashfulness that it constitutes in my opinion a most important resource for the study of the evolution of the social sense.

In this last case we have before us, in short, a phenomenon of rather complex self-consciousness — a thing of *ideal* value — and its suggestion-complexes, as they body themselves forth in the child's reactions, tell of his extraordinary progress in the understanding of himself and the world. He now begins to show the germ of modesty and of all the emotions akin to and contrary to it.

With this degree of progress we may now leave the child, not undertaking the discussion of the development of true modesty in its later stages in the intricate special movements of adolescence: but it remains to point out the congruity between this scheme of the child's different behaviours in respect to persons and the different personal suggestions which in an earlier place [1] we found him actually getting from others.

It will be remembered that several aspects of the child's

[1] Cf. § 3 of this chapter, above, which restates an article on 'Personality Suggestion,' in *The Psychological Review*, I., p. 274, May, 1894.

personal environment were found to appeal to him in a progressive way. It seemed fair to think that persons are at first to him only a peculiar part of his 'projected,' presented, objective, world of things. He has 'personal projects,' as we found it well to call them, before he has any sense of himself as a spiritual being or as the subject of his own mental processes. The getting of objects seems to be part of the business for which his nervous equipment more or less adequately provides, and among these objects, the persons who move around him get themselves characterized by very important marks.

The observation of organic bashfulness tends, when viewed in connection with this earlier point, to confirm this view of the way the child begins to apprehend persons; and at the same time, it enables us to see a little farther. For strange as it may appear, we are here confronted with an element of organic equipment especially fitted to receive and respond to these peculiar objects, persons, 'personal projects.' The child strikes instinctively an extraordinary series of attitudes when persons appear among his objects, attitudes which other objects, *qua* objects, do not excite. And later in life, in the organic effects indicative of modesty, such as blushing, hesitating, etc., we find similar signs of a social *rapport* which has grown into the very fibres of our nerves. These attitudes extend somewhat to animals, as we have seen; and that makes it all the more striking. For animals are persons, to a child of that age; they act upon him through his animal parts, through physical pains, pleasures, fears, etc., and that is the only way that persons also can act upon an infant a year old.

We have to say, therefore, that the child is born to be a member of society, in the same sense, precisely, that he is born with eyes and ears to see and hear the movements and sounds of the world, and with touch to feel the things of space; and, as I hope to show later in detail,[1] all views of the man as a total creature, a creation, must recognize him not as a single soul shut up in a single body to act, or to abstain from acting, upon others similarly shut up in similar bodies; but as a soul partly in his own body, partly in the bodies of others, to all intents and purposes, so intimate is this social bond — a service for which he pays in kind, since we see in his body, considered simply as a physical organism, preparation for the reception of the soul-life, the suggestions of mind and spirit, of those others. I do not see wherein the community of the senses together, in a single life of nervous activity, differs very much in conception from this community of men, bound together by the native ties which lie at the basis of their most abstract and developed social organizations.

Again, the second phase of the child's actions in the presence of persons — the freer, more ready reception of strangers and intercourse with them, seen usually during the second year — this also gives us what our earlier notes on 'personality-suggestion' would lead us to expect. We saw that the child begins to find out more about persons, and so to gain associations which give him the beginning of certain expectations regarding them; self-formed expectations, that is, no longer dependent merely upon the stirrings of instinct and inherited impulse. He learns that pleasure almost always comes from persons, and so does the alleviation of pain. This is a mortal blow at organic bashfulness, as every father and mother knows. A lump of sugar will very soon release the inhibitions of the shy year-old. Then he further learns something of the characteristics of persons, the irregularity of personal action, the presence of the 'personal equation'

[1] Now made the principal thesis of the volume *Social and Ethical Interpretations.*

of mood and feeling in those nearest to him. This leads him to seek out methods, somewhat individual to himself, of pleasing these near persons and of securing their smile and approbation, or of escaping the reproofs which even his shyness brings; and these he substitutes for the blinder attempt, which nature taught him, to hide his physical person.

And he also learns our habits, the regularities of character in adults, and so learns that nobody means to hurt him, after all. It is amusing how soon a two- or three-year-old child 'sizes up' a stranger, and meets him halfway with conduct more or less appropriately attuned to the indications of character shown in the face and acts of the newcomer.

So, with all this, the instinctive or 'organic' bashfulness gets rapidly rubbed away. But it is now clear that the means of this freedom from it are all social. A child's growth away from the instinct of social fear to the apprehension of social truth, and all his actions midway in this progress, come only from varied and persistent experience of people and appeals to living examples. How can character be apprehended if characters are absent? And how can character schemes be grown into, if the regularity of the child's life is of so narrow a scope that all the threads of his social relationship run the same way, and no tangles and confusions arise to bring out his own strenuous action and his rebellions against his native reflex ways of behaviour?

The oncoming of true bashfulness, finally, — the bashfulness which shows reflection, in its simpler form, upon self and the actions of self, — represents the child's direct application of what he knows of persons to his own inner life. It is what we have called the 'subjective' stage in his sense of personality.[1]

[1] See *Mind*, January, 1894; also below, Chap. XI., § 3.

But, as we shall also see, this grows only apace with the contrary movement by which he assigns his own enriched mental experience back to his teacher, and seeks his further judgment upon it. The child, when he knows himself able to draw a figure, for example, does not know this alone, or this completely. He has also the sense of the social 'copy' or example from which the lesson was learned, and further and with it, he knows that his performance is again subject to revision in light of the approval or disapproval of teacher or friend. The performances of the self cannot in any case be freed from the sense of possible inspection by others, and the child shrinks from this inspection. This has further development below. Suffice it to say that in this higher *rapport*, which involves clearly the sense of self-agency, but self-agency still tied down to the agency of other people like self, — here in the real reflective relation of self to others, — comes the third and crowning stage of the class of phenomena known by the word 'bashfulness.' My children do their imperfect tasks for me because they know me to understand and be indulgent: even the elder assumes the patron, and says of the younger: 'She is so little, you know.' But in the presence of the stranger whose opinion is not known beforehand, they are bashful with the sense of new standards perhaps firmly insisted upon. This is where the inhibiting suggestion of true bashfulness appears: that of modesty, and clearly also that of certain ethical emotions.

The whole situation becomes, I may add, an extraordinary point of vantage for estimating the development view of the origin of the social and personal sense. We have in it direct evidence of the growth of the social instinct by accretions from experiences of social conditions — or if we go into refinements of biological theory, from the adding up of variations all fitted to survive socially — and direct evidence, further, of the lines of progress which these experiences and variations have marked out. For the infant is an embryo person, a social unit in the process of forming; and he is, in these early stages, plainly recapitulating the items in the social history of the race.[1]

This social evolution presents a phase, therefore, of general development in which the theory that the individual goes through stages which repeat the race-stages of his species ought to find illustrations of more than common value. For the social life is a late attainment, whether considered anthropologically or racially, and the child waits to begin the series of 'laps in the social race' until he meets us, his observers, face to face. The embryology of society is open to study in the nursery.

I think, accordingly, that several important hints at the history of societies, both animal and human, are afforded by the phenomena of bashfulness as now described. These I can do no more than mention at present.

Organic bashfulness would seem to represent the instinctive fear shown by the higher animals, coupled with the natural family and gregarious instincts which they have. This shades up into the more fearless and more confiding attitudes of certain passably peaceable creatures, which take kindly to domestication, and depend more upon animal organizations and natural defences, such as those afforded by geographical distribution, coloration, habits of life, etc., for their protection. For the social protections are after all more effective for the defence of racial life and propagation than the special instinctive armament of individuals. Then, of course, only in man do we find the stage of reflective

[1] See the discussion of the biological theory of 'Recapitulation,' above, Chap. I.

thought on self and the social relations of self, which is seen germinating in the child in the third year or later.

The parallel seems also to be worth something to the anthropologist when he comes to inquire into the history of the human species. Admitting with Westermarck that man as a species is monogamous and tends to family life, we should find in his earliest history the period corresponding to the organic bashfulness of the child; and its instinctive presence in the very young child lends some support, perhaps, to Westermarck's view. The later tribal and nomadic conditions possibly tended to release the cords of an instinct so purely defensive, and to bring in the freer range of peaceful pursuits represented, it is conceivable, by the second stage of the child's history; while again the stage of development of the distinctly industrial, artistic, and commercial life of man, with its social ways of solving all problems of public welfare, corresponds to the more reflective attainments of the period which is seen dawning in the true bashfulness of the three-year-old. For there can be no doubt that recent writers are correct in finding that the more refined egoism is a reflex from the more generalized socialism; a thesis which social psychology takes now from the analyses of men like Balzac and Bourget and the insights of Tarde and the historians of society; but one which it is itself quite able, I think, to make good by its own methods of inquiry.

§ 7. *Hypnotic Suggestion*

The facts upon which the current theories of hypnotism are based may be summed up under a few heads, and the recital of them will serve to bring this class of phenomena into the general lines of classification drawn out in this chapter.

The Facts.—When by any cause the attention is held fixed upon an object, say a bright button, for a sufficient time without distraction, the subject begins to lose consciousness in a progressive way. Generalizing this simple experiment, we may say that any method or device which serves to secure undivided and prolonged attention to any kind of a 'suggestion,' — be it object, idea, anything that can be thought about, — this brings on what is called hypnosis to a person normally constituted.

The Paris school of interpreters find three stages of progress in the hypnotic sleep: First, *catalepsy*, characterized by rigid fixity of the muscles in any position in which the limbs may be put by the experimenter, with great *suggestibility* on the side of consciousness, and anæsthesia in certain areas of the skin and in certain of the special senses; second, *lethargy*, in which consciousness seems to disappear entirely, the subject cannot be aroused by any sense stimulation by eye, ear, skin, etc., and the body is flabby and pliable as in natural sleep; third, *somnambulism*, so called from its analogies to the ordinary sleep-walking condition to which many persons are subject. This last covers the phenomena of ordinary mesmeric exhibitions at which travelling mesmerists 'control' persons before audiences and make them obey their commands. While other scientists properly deny these distinct stages as such, they may yet be taken as representing extreme instances of the phenomena, and serve as points of departure for further discussion.

On the mental side the general characteristics of hypnotic somnambulism are as follows: 1. *The impairing of memory* in a peculiar way. In the hypnotic condition all affairs of the ordinary life are forgotten; on the other hand, after waking, the events of the hypnotic condition are forgotten. Further, in any subsequent period of hypnosis the events of the former similar periods are remembered. So a person who is habitually hypnotized has two continuous memories; one for the events of his normal life, only when he is normal, and one for the events of his hypnotic periods, only when he is hypnotized.

2. *Suggestibility* to a remarkable degree. By this is meant the tendency of the subject to have in reality any mental condition which is suggested to him. He is subject to suggestions both on the side of his receptivity to impressions and on the side of action. He will see, hear, remember, believe, refuse to see, hear, etc., anything, with some doubtful exceptions, which may be suggested to him by word or deed, or even by the slightest and perhaps unconscious indications of those about him. On the side of conduct his suggestibility is equally remarkable. Not only will he act in harmony with the illusions of sight, etc., suggested to him, but he will carry out, like an automaton, the actions suggested to him. Further, pain, pleasure, and the organic accompaniments of them may be produced by suggestion. The arm may be actually scarred with a lead-pencil if the patient be told that it is red-hot iron. A suggested pain brings vasomotor and other bodily changes that prove, as similar tests in the other cases prove, that simulation is impossible and the phenomena are real. These phenomena and those given below are no longer based on the mere reports of the 'mesmerists,' but are the recognized property of legitimate psychology.

Again, such suggestions may be for a future time, and get themselves performed only when a determined interval has elapsed; they are then called *deferred* or *post-hypnotic* suggestions. Post-hypnotic suggestions are those which include the command not to perform them until a certain time after the subject has returned to his normal condition; such suggestions are — if of reasonably trifling character — actually carried out afterward in the normal state, although the person is conscious of no reason why he should act in such a way, having no remembrance whatever that he had received the suggestion when hypnotized. Such post-hypnotic performances may be deferred by suggestion for many months.

3. So-called *exaltation* of the mental faculties, especially of the senses: increased acuteness of vision, hearing, touch, memory, and the mental functions generally. By reason of this great 'exaltation,' hypnotized patients may get suggestions which are not intended, from experimenters, and discover their intentions when every effort is made to conceal them. Often emotional changes in expression are discerned by them; and if it be admitted that their power of logical and imaginative insight is correspondingly exalted, there is practically no limit to the patient's ability to read, simply from physical indications, the mental states of those who experiment with him.

4. So-called *rapport.* This term covers all the facts known, before the subject was scientifically investigated, by such expressions as 'personal magnetism,' 'will power' over the subject, etc. It is true that one particular operator alone may be able to hypnotize a particular patient; and in this case the patient is, when hypnotized, open to suggestions only from this person. He is deaf and blind to everything enjoined by any one else. It is easy to see from what has already been said that this does not involve any occult nerve influence or mental power. A sensitive patient anybody can hypnotize, provided only that the patient have the idea or conviction that the experimenter possesses such power. Now, let a patient get the idea that only one man can hypnotize him, and that is the beginning of the hypnotic

suggestion itself. It is a part of the suggestion that a certain personal *rapport* is necessary; so the patient must have this *rapport*. This is shown by the fact that, when such a patient is hypnotized, the operator in *rapport* with him can transfer the so-called control to any one else simply by suggesting to the patient that this third party can also hypnotize him. *Rapport*, therefore, and all the amazing claims of charlatans to powers of charming, stealing another's personality, controlling his will at a distance — all such claims are explained, as far as they have anything to rest upon, by suggestion under conditions of mental hyperæsthesia or exaltation.

I may now add certain practical remarks which may tend to mark off the range of the phenomena more clearly.

In general, any method which fixes the attention to a single stimulus long enough is probably sufficient to produce hypnosis; but the result is quick and profound in proportion as the patient has the idea that it is going to succeed, *i.e.* gets the suggestion of sleep. It may be said, therefore, that the elaborate performances, such as passes, rubbings, mysterious incantations, etc., often resorted to, have no physiological effect whatever, and only serve to work in the way of suggestion upon the mind of the subject. In view of this it is probable that any person in normal health can be hypnotized, provided he is not too sceptical of the operator's knowledge and powers; and, on the contrary, any one can hypnotize another, provided he do not arouse too great scepticism, and is not himself wavering and clumsy. It is probable, however, that susceptibility varies greatly in degree, and that race exerts an important influence. Thus in Europe the French seem to be the most susceptible, and the English and Scandinavians the least so. The impression that weak-minded persons are most available is quite mistaken. On the contrary, patients in the insane asylums, idiots, etc., are the most refractory. This is to be expected, from the fact that in these cases power of strong, steady attention is wanting. The only one class of pathological cases which seem peculiarly open to the hypnotic influence is that of the hystero-epileptics, whose tendencies are toward extreme suggestibility. Further, one may hypnotize himself — so-called *auto-suggestion* — especially after having been put into the trance more than once by others.[1]

So-called 'criminal suggestions' may be made, with more or less effect, in the hypnotic state. Cases have been tried in the French courts, in which evidence for and against such influence of a third person over the criminal has been admitted. The reality of the phenomenon, however, is in dispute. The Paris school claims that criminal acts can be suggested to the hypnotized subject which are just as certain to be performed by him as any other acts. Such a subject will discharge a blank-loaded pistol at any one, when told to

[1] It is further evident that frequent hypnotization is very damaging if done by the same operator, since then the patient contracts a habit of responding to the same class of suggestions; and this may influence his normal life. A further danger arises from the possibility that all suggestions have not been removed from the patient's mind before his awaking. Competent scientific observers always make it a point to do this. It is possible also that damaging effects result directly to a man from frequent hypnotizing; and this is probable to a degree, simply from the fact that the state is abnormal and, while it lasts, pathological. Consequently, all general exhibitions in public, as well as all individual exercises of this kind, should be prohibited by law, and the whole practical application, as well as observation of hypnosis should be left in the hands of physicians and scientific men who have proved their competence and fitness.

Farther, Liégeois suggests — what is quite an unnecessary resource — that every child should be hypnotized by a special official, and the suggestion made to him, once for all, that no one under any circumstances shall be able to throw him into hypnosis again. In Russia, a decree (summer, 1893) permits physicians to practise hypnotism for purposes of cure under official certificates. In France public exhibitions are forbidden.

do so, or stab him with a paper dagger. While admitting the facts, the Nancy theorists claim that the subject knows the performance to be a farce; gets suggestions of the unreality of it from the experimenters, and so acquiesces. This is probably true, as is seen in frequent cases in which patients have refused, in the hypnotic sleep, to perform suggested acts which shocked their modesty, veracity, etc. This goes to show that the Nancy school are right in saying that while, in hypnosis, suggestibility is exaggerated to an enormous degree, still it has limits in the more well-knit habits, moral sentiments, social opinions, etc., of the subjects. And it further shows that hypnosis is probably, as they claim, a temporary disturbance, rather than a pathological condition of mind and body.

There have been many remarkable and sensational cases of cure of disease by hypnotic suggestion reported, especially in France. That hysteria in all its manifold manifestations has been relieved is certainly true, but that any organic, structural disease has ever been cured by hypnotism is unproven. It is not regarded by medical authorities as an agent of much therapeutic value, and is rarely employed; but it is doubtful, in view of the natural prejudice caused by the pretensions of charlatans, whether its merits have been fairly tested.[1]

[1] On the European continent it has been successfully applied in a great variety of cases; and Bernheim has shown that minor nervous troubles, insomnia, migraines, drunkenness, lighter cases of rheumatism, sexual and digestive disorders, together with a host of smaller temporary causes of pain — corns, cricks in back and side, etc. — may be cured or very materially alleviated by suggestions conveyed in the hypnotic state. In many cases such are permanently effected with aid from no other remedies. In a number of great city hospitals, patients of recognized classes are at once hypnotized and suggestions of cure made. Liébault, the founder of the Nancy school, has the credit of having first made use of hypnosis as a remedial agent. It is also becoming more and more recognized as a method of controlling refractory

Theory. — Two rival theories are held as to the general character of hypnosis. The Paris school already referred to, led by Charcot, hold that it is a pathological condition which can be induced only in patients already mentally diseased, or having neuropathic tendencies. They claim that the three stages described above are a discovery of great importance.[1] The so-called Nancy school, on the other hand, led by Bernheim, deny the pathological character of hypnosis altogether, claiming that the hypnotic condition is nothing more than a special form of ordinary sleep brought on artificially by suggestion. Suggestion, they say, is only an exaggeration of an influence to which all persons are normally subject. All the variations, stages, curious phenomena, etc., of the Paris school, say they, can be explained by this 'suggestion' hypothesis. The Nancy school is completely victorious, as far as the great mass of the facts are concerned.[2]

The facts show an intimacy of interaction between mind and body, to which current psychology in its psycho-physical theories is only beginning to do justice; and it is this aspect of the whole matter which I would emphasize in this connection. It will be observed that all the phases of 'suggestion' passed in review in earlier sections of this chapter get direct illustration from similar phenomena occurring in hypnosis. I need not cite them again in detail. The hypnotic condition

and violent patients in asylums and reformatory institutions. It must be added, however, that 'in general' psychological theory rather than medical practice is seriously concerning itself with this subject.

[1] The best books on this side are, Binet and Féré, *Animal Magnetism;* Janet, *Automatisme Psychologique;* Charcot's medical treatises (*Œuvres complètes*, Vol. IX.); numerous articles in the *Revue Philosophique.*

[2] Their best books are, Moll, *Hypnotism;* Bernheim, *Suggestive Therapeutics; Études nouvelles sur l'Hypnotisme;* Ochorowicz, *Mental Suggestion.* Cf. my popular articles 'Among the Psychologists of Paris' and 'With Bernheim at Nancy' in the *Nation* (N.Y.), July 28 and Aug. 11, 1892, and 'Hypnotism' in the new edition (1894) of *Johnson's Universal Cyclopædia.*

of consciousness may, therefore, be taken to represent the thing called 'suggestion' most remarkably.

§ 8. *Law of Dynamogenesis*

The facts of suggestion now given may be generalized under a so-called 'law,' which current psychology and biology agree in accepting as a well-established principle of the manifestations of organic and mental life. The principle of contractility recognized in biology simply states that all stimulations to living matter, — from protoplasm to the highest vegetable and animal structures, — if they take effect at all, tend to bring about movements or contractions in the mass of the organism. This is now also safely established as a phenomenon of consciousness — that every sensation or incoming process tends to bring about action or outgoing process. The facts of suggestion now set forth may be taken as, in so far, an array of evidence in support of what we may call, once for all, *Dynamogenesis*. Certain practical illustrations of it are given in the chapters which immediately precede: they show also the sure foundation of the method of studying children which I have based upon it. I shall accordingly expect no opposition to the use of this principle as the foundation-stone of the theory of organic development developed subsequently in this work, however faulty my presentation of it may be in the eyes of competent critics in either of these sciences.

In attempting, however, to reach some kind of formula of dynamogenesis we encounter a certain difficulty. For when we had occasion to inquire in an earlier place what the main character of all suggestion is, that character which constitutes its suggestion, we found definitions very conflicting; and gave as our own definition only the most general description of the reaction called suggestive, *i.e.* that it involved consciousness and issues in a movement more or less closely associated in earlier experience with the particular stimulus in question.[1]

This, it is plain, constitutes suggestion a phenomenon of greater or less *habit*, taking hypnotic suggestion as type, in which prompt discharges in well-formed pathways is the striking fact. Numerous instances among the facts reported in this chapter come to mind. The statement ordinarily made in the more recent psychologies, to the effect that the idea of a movement is already the beginning of that movement, serves to generalize these facts, provided we understand by the 'idea of movement,' not merely the clear consciousness of a movement, but also the vaguest and most subconscious reminiscences, feelings, intimations of movement, which cluster or hang about or enter into, however meagrely, the state of mind which issues in the movement making up the suggested reaction.

But it is just as evident, when we recall the various instances in detail, that they have another and different aspect. Very many suggestions seem to perform a function which is not exhausted when we say that they issue in movements. They issue in movements, it is true; but not in exactly the movements and those alone which have been associated with these stimuli before. Many of them seem to beget new movements, by a kind of adaptation of the organism — movements which are an evident improvement upon those which the organism has formerly accomplished.

To make this plain we have only to recall some cases from

[1] We may distinguish dynamogenesis from suggestion by saying that the former is the broader, — the fact that changes in movement always follow changes in stimulus. Suggestion, on the other hand, defines the particular change that issues from a particular stimulus of a sort that is accompanied by consciousness.

the reports made in this chapter and the earlier ones. The child learns handwriting by acting upon the suggestion which the copy set before him affords. How could he control his movements at all, if each suggestion called out only the movements which he had already learned? The child adapts himself again to persons, and differently to different persons, from week to week. How does he do this? Persons of course suggest action to him, but how does he manage to break up, in appropriate ways, the fixed organic tendencies to action in which we have found early bashfulness to consist? The child learns to estimate distance, and his visual experiences become, as we have seen, suggestions to him of hand movements remarkably adjusted to his reach and to the dimensions, etc., of things. How is this done? And so might more cases be cited.

This aspect of suggestion opens up what is one of the main problems of this book to discuss, the theory of *Accommodation*. It is only in point here to show that this thing, accommodation, is a fact, and that it consists in some influence in the organism which works directly in the face of habit. Suggestion works to break up habit.

We saw above, also, two views as to the presence and influence of consciousness in this matter of suggestion. Some theorists hold that there is no suggestion without consciousness; others that consciousness is not a necessary element. The dispute seems to turn upon the predominant recognition in reactions of one of the two tendencies, Habit or Accommodation. It is true and universal that consciousness tends to disappear from reactions as they are oftener repeated — as they become, that is, more habitual. The things we have learned to do best, most definitely, most exactly, must *unalterably* in a word, these things require least thought, direction, feeling, consciousness. So with our reflex and semiautomatic actions: they come to go on, as pathological cases show, without the cortex of the brain, in cases when fainting or forgetfulness deprive us of all knowledge that we do them. On the other hand, we find that whenever there is accommodation — the breaking up of habit, the effort to learn, the acquirement of new movements, and co-ordinations of movement — there consciousness is present, and present in vivid and heightened form according as the habit fought against is fixed, and the road to the new acquisition an uphill road. The things most new, difficult, imperfect, hard to effect, these dwell in the very focus of our personal knowledge and attention.

As I said some time ago, in summing up the two different principles: "Physiologically, Habit means readiness for function, produced by previous exercise of that function. . . . Psychologically, it means loss of oversight, diffusion of attention, subsiding consciousness. . . . Physiologically and anatomically, Accommodation means the breaking up of a habit, the widening of the organic for the reception or accommodation of a new condition. Psychologically, it means reviving consciousness, concentration of attention, voluntary control." [1]

So far as we have now gone we have a right to use the principle of suggestion, and to illustrate the broader principle of dynamogenesis, whenever we mean to say simply that action follows stimulus. But when we come to ask what kind of action follows, in each case, each special kind of stimulus, we have two possibilities before us. A habit may follow, or an accommodation may follow. Which is it? And why is it one rather than the other? These are the questions of the theory of organic development, to which our next chapters are devoted.

[1] *Handbook, Feeling and Will*, p. 49.

PART II

BIOLOGICAL GENESIS

CHAPTER VII

The Theory of Development[1]

§ 1. *Organic Adaptation in General*

In the preceding discussions we have traced some phases of the development of consciousness. The two great principles of Habit and Accommodation have been noted, simply, and we have intimated incidentally that by them two great gains are made possible to the organism: first, the repetition of what is worth repeating, with the conserving of this worth: this is Habit; and, second, the adaptation of the organism to new conditions, so that it secures, progressively, further useful reactions, which at an earlier stage would have been impossible: this is Accommodation. It now remains to give these two principles a searching examination.

Further, the fundamental fact of reaction itself, at whatever stage it be looked at, is expressed by the principle of Dynamogenesis, which, when put broadly, reads: Every organic stimulus tends to bring about changes in movement. This we have illustrated in the preceding chapters.

The psychological bearings of these principles are taken

[1] Development is here used in the general sense as covering both racial evolution and individual development. The problem of evolution as such is now explicitly treated in the work, *Development and Evolution* (1902).

up below. It remains to ask here whether we can go farther in a constructive way on the physiological side.

A little reflection leads us to see that the main question of adaptation is still unanswered. It is evident that repetitions plus accommodations give adaptations; and that adaptations involve, in some way, so-called 'selections.' Where in the function of the organism does the remarkable fact of selection come in? How does the organism select the proper things to accommodate itself to, and refuse the improper?

The real meaning of this question becomes clear when we put it differently. Considering the state of an organism at any moment, with its readiness to act in an appropriate fashion, — say a child's imitation of a movement, — the appropriateness of its action may be construed in either of two ways: either *retrospectively* or *prospectively*. By construing it retrospectively, I mean that an organism performs its appropriate function when it does what it has done before — what it is suited to do, however it may have come to be so suited. The child imitates my movement because his apparatus is ready for this movement. This is Habit; it proceeds by repetition. But when we come to ask how it got to be suited to do this function *the first time*, or how it can come to do a new function *from now on*, — how the child manages to imitate a new movement, one which he has never made before, —this is the *prospective reference*, and this question we must now try to answer.

To illustrate from the highest sphere, that of the voluntary learning of new actions: Suppose I see a man draw a picture, or paint a landscape, and realize that it represents a very useful accommodation of muscular movements, and then desire to imitate him. I am not able simply to tell my muscles to do it, or simply to will to do what he does. I find my muscles are chained down to what I have already learned, to what they have done before; my actions, that is, have the *retrospective* reference. So the child sees me write a letter or cut a toothpick, and he is quite unable to do it. He must learn, we say. But that is just the question of prospective reference: how is he to learn? How is it possible for an organism to acquire any new adaptive movement whatever?

When we come to look broadly at the biological series and take all the resources of modern evolution doctrine into account, we find several ways in which the reactions of an organism may get such a 'prospective reference,' all of which are partial statements of a more fundamental one, and each of which has its peculiar value in its own place in the phylogenetic series. These different ways in which an organism 'learns' new accommodations may be set forth in order.

1. *Natural selection as operative directly upon individual organisms.* If we suppose, at first, organisms capable of reacting to stimulations by random diffused movement, we may then suppose the stimuli to which they react to be some beneficial and some injurious. If the beneficial ones recur more frequently to some organisms, these would live rather than others to which damaging stimuli came more often. The former, therefore, would be selected; and it *amounts to the same thing* as if organisms of neutral character had learned, each for itself, to react to certain beneficial stimuli only. This is the current Darwinian position.

But we may go a step further. Assuming variations in organic forms, it is easy to see that some of them might react in a way to keep in contact with the stimulus, to lay hold on it, and so keep on reacting to it again and again —just as our rhythmic action in breathing keeps the organism in vital contact with the oxygen of the air. These organisms would get all the benefit or damage of the repetition or persistence of the stimulation and of their own reactions, again and again; and it is self-evident that the beneficial stimulations are the ones which should be maintained in this way, and that the organisms which did this would live. The organisms which reacted in such a way as to retain the damaging stimulations, on the other hand, by this same process, would aid nature in killing themselves. If this be true, only those organisms would survive which had the variation of retaining useful stimulations in what I have called in speaking of imitation elsewhere a 'circular way' of reacting. Thus unicellular creatures of this particular kind were selected, we may suppose, as a matter of fact, from absolutely random-moving creatures, if any such existed — a point discussed below. And as all others died out in competition with them, it became a universal property of vital organisms of any degree of development that they should react to retain their own vital stimulations. Now this again is *exactly the same result* as if originally neutral organisms had each for itself learned to make this particular kind of reaction. The life principle has learned it, but with the help of the stimulating environment and natural selection.[1]

But the question remains: what kind of reaction would it be that such a creature would possess to accomplish this result? What would be the nature of the variation? Evidently the easiest answer to this question is, that consciousness with its selective property arises here, and by it new actions are selected.[2] But I do not see how consciousness could accomplish the fact of selection, even though it arose as a variation, until after it had itself experienced the reaction to be

[1] More is said of this below in § 2 of this chapter, and in Chap. IX., where particular evidence is cited.

[2] Something of this sort seems implied in the 'subjective selection' of J. Ward (art. 'Psychology,' in the *Encycl. Brit.*, 10th ed.).

selected. This would mean that it had some property of selecting out during the organism's life history certain kinds of reaction *already possible* to this particular organism. But since it is possible for an organism to have the stimulus-retaining reactions which I have described, simply by its own responses, this may be considered sufficient for its survival anyhow, whether it were conscious or not. So I see no argument one way or the other as to the origin of consciousness at this first stage of natural selection. The case is different, however, when we come to consider *development during the life history of the particular organism.*

2. *Natural selection as operative upon different reactions of the same organism.* The fact of 'life history' is just what distinguishes an organism from what is a 'mechanical arrangement,' and not an organism. A steam engine has no life history because it makes no progress, it simply repeats a constant function. That engine survives which is best adapted, in its construction, to the function of an engine. That is the principle already cited. It is necessary to consider further how certain reactions of one single organism can be selected so as to adapt the organism better and give it a life history. Let us at the outset call this process 'functional selection,'[1] in contrast with the 'natural selection' of whole organisms.

Our first principle would do no more than effect the survival of organisms which repeated or retained useful stimulations. If this worked alone, every change in the environment would weed out all life except those organisms which by accidental variation reacted already in the way demanded by the changed

[1] In earlier editions this was called 'Organic Selection,' but later (in *Development and Evolution*) this term was confined to the result of the process in directing the course of evolution (a matter, of course, already intended here).

conditions — in every case new organisms showing variations, not in any case new elements of life history in the old organisms. In order to the latter, we would have to conceive one of two things: either, first, an innate capacity of the organism to anticipate and be ready for new conditions; or second, some modification of the old reactions in an organism through the influence of new conditions, in such a way that this modified reaction serves to retain the desirable stimulations of the environment, while the old ways of reacting do not. The first of these two conceptions might be realized in turn by either of two alternatives: first, by heredity; and second, by the special creation of each organism for its peculiar environment. But the first of these, besides being excluded by our hypothesis that we are at the beginning of the phylogenetic series, would leave over the question: How did the ancestors come to be adapted? And the second calls upon us to give up the conception of phylogeny altogether. We are, accordingly, left to the view that the new stimulations brought by changes in the environment, themselves modify the reactions of an organism in such a way that these modified reactions serve to hold or repeat the new stimulations as far as they are good, and further, negatively, in such a way that the former reactions become under the new condition less useful or positively damaging.

It may be said that the earlier application of natural selection directly to the salvation of organisms meets this case also, provided organic forms arise by variation which are suited to react to the new environment. And it is possible to hold, I think, that some phylogenetic progress in development is secured in that way, a point which has further discussion below. But the facts show, at any rate, that individual organisms do acquire new adaptations in their lifetime, and that is our first problem. If, in solving it, we find a principle which may also serve as a principle of race development, then we may possibly use it against the 'all-sufficiency of natural selection,' or in its support.[1]

The one kind of organic process which would accomplish the selection of reactions in an organism's life history is the one which we actually find — which is to say that our theory waits as it should upon facts. There is a process by which the theatre of the application of natural selection is transferred from the outside relations of the organism, its relations to its environment, to the inside relations of the organism. It takes the form of the *functional adjustment of the life processes by variations in the motor responses*, so that beneficial reactions are selected from the entire mass of responses.

This process seems to involve — to state a further point — the *neurological analogue of the hedonic consciousness;* and the two aspects in which the happy variation shows itself in the consciousness of the higher organisms are *pleasure* and *pain*. These points may be summed up for discussion in the general proposition: *the life history of organisms involves from the start the presence of the organic analogue of the hedonic or pleasure-pain consciousness.*

From what has been said it is clear that, in order to life history in an organism, it must have in its central processes not only the facile function required by habitual discharge,

[1] This passage anticipates the explicit development of 'organic selection' in later publications — the view, that is, that individual accommodations, by supplementing certain variations, guide evolution in definite lines.

I know a further objection may be made, and it may be as well to state it here, while reserving its discussion for a later place (§ 3 of this chapter). It may be said that even in the life of the individual new actions are not acquired; they simply serve in the individual to show the details of the variation which the individual has got congenitally. On that view the new functions do not secure gains for the following generation, but only put in evidence the variations already secured over the earlier generation: so certain critics of organic selection, *e.g.* Whitman, Plate, etc.

but also some means of anticipating new stimulations, and so of utilizing them to its own advantage. The empirical analysis of pleasure and pain states requires the recognition of these two facts, on any theory of the hedonic consciousness, *i.e.* first, pleasure accompanies normal psycho-physical process, or its advancement by new stimulations which are vitally good; and second, pain accompanies abnormal psycho-physical process, or the anticipation of its being brought about by new stimulations which are vitally bad.[1] This is generalized in the principles, current since Bain insisted upon them, that pain is indicative of a physiological process which is inhibitory of the function which occasions the pain, and pleasure, on the other hand, advances its corresponding function; although, as I aim to show in the following pages, the formulation of Bain requires important modifications. In a later place I speak further of the rise of consciousness as this view seems to implicate it.[2]

Advantage has now been seen to lie in reactions by which certain stimulations are retained or repeated and certain others avoided. Now the former are the reactions to stimulations which give pleasure, the latter reactions to those which give pain. The general scheme of Meynert, which identifies the pleasure-giving process with the central innervation of outreaching movements, and the pain-giving process similarly with that of withdrawing movements, — expansions on the one hand, and contractions on the other, — affords, disregarding details which I need not now dwell upon, support to this requirement.[3] Richet expresses the general facts very

[1] Baldwin, *Handbook of Psychology*, II., Chaps. V., XI. (in substance).

[2] Cf. § 4 of this chapter.

[3] *Populär-wissenschaftliche Vorträge*, pp. 41 ff. Meynert's theory has recently been given some experimental support by Münsterberg, *Beiträge zur exper. Psych.*, Heft 4. For the detailed treatment of such so-called 'Organic Imitations,' see below, Chap. IX.

clearly; beginning with pain, he says: "There takes place a series of general movements of flexion, as if the animal wished to make itself smaller and to offer less surface to the pain. . . . With man, as with all other animals, we find the same general movements of flexion and extension, corresponding to feelings of pain and pleasure. Pleasure corresponds to a movement of spreading out, dilatation, extension; on the contrary, in pain we draw back, shut ourselves up, by general movements of flexion." [1]

It may be objected, however, that this does not meet the need of anticipatory adjustment; and such an objection to Meynert's own view is, I think, well taken. Admitting the probable truth of the theory of Meynert as far as it goes, and its essential conformity to the requirements of a true theory of motor development, we may further find from the two correspondences mentioned the element which is still lacking, and which can only be supplied by an adequate theory of the physical basis of pleasure and pain.

If development is by repetition, and if repetition can be secured, apart from accident, only by a functional variation of the type called 'circular reaction,' or one which repeats or retains its own stimulation, then a new stimulus can be accommodated to only within the limits inside of which the organ can prepare itself, on the basis of former processes, to bring about such a reaction as will tend to retain this kind of stimulus for itself. This is accomplished, *in the whole range of motor accommodations, from the protozoa*[2] *which swarm to the light to the most difficult feat of the acrobat*, by what we may generalize under the phrase 'law of excess'; it is an application within the organism of the principle upon

[1] *L'Homme et l'Intelligence*, p. 9, quoted by Ward.

[2] This is now interestingly confirmed by the valuable researches and conclusions of Jennings (*Behaviour of Lower Organisms*, 1906).

which the natural selection of particular organisms is secured — the principle commonly known as 'over-production.' But generally, the law of 'excess' may be stated somewhat as follows: *the accommodation of an organism to a new stimulation is secured, apart from happy accidents, by the continued or repeated action of that stimulation, and this repetition is secured, not by the selection beforehand of this stimulation nor of appropriate movements, but by the proximate reinstatement of it by a discharge of the energies of the organism, concentrated as far as may be for the excessive stimulation of the organs most nearly fitted by former habit to get this stimulation again.*[1]

Assuming that such a supplement to the current psycho-physical theories of pleasure-pain is necessary, and that the details are left open of what the actual cellular processes are by which this 'excess discharge' is secured, our task is to explain and justify this law of excess. This we may endeavour to do, dividing the cases of Accommodation or Adaptation into three heads, — the word 'adaptation' being used as in biology for the fixed results of accommodation processes. We will have to show that the three great stages of adaptation are brought under the formula of 'functional selection' by means of the auxiliary principle of 'excess.'[2] To make these three spheres plain to psychologists we may designate them as, first, 'biological adaptations' (modifications of structure, of instinct, the correlation of parts, and organic adaptations in general); second, the reactions in which so-called 'reflex attention' dominates (simple imitation, suggestive accommodation and control, the learning of infants short of voluntary effort); third, the conscious selection of ends

[1] The *negative* of concentration or its *reverse* supplies the conditions of retreat from a damaging stimulation — I suppose some form of draining, with Darwin's 'antithetic' motor action and Meynert's *Abwehrbewegungen*.

[2] Natural selection being of course assumed, working to select individuals of the 'accommodating' type.

and their pursuit by volition (voluntary attention, effortful action, 'conduct'). These three forms of adaptation are treated in the course of this work under the headings, respectively, of 'Organic Imitation,' 'Conscious Imitation,' and 'Volition.' If successfully made out, this will present to us a theory of unity in the motor life, and an addition to the evolution theory acceptable to psychologists.

Before proceeding further, however, it may be well to state the theory hitherto principally propounded and advocated by psychologists, as well as by biologists, and to examine it in view of the requirements now indicated; this comparison will also serve to bring out our own positions more clearly.

§ 2. *Current Biological Theory of Adaptation*

It is clear that we are led to two relatively distinct questions: questions which are now familiar to us when put in the terms covered by the words 'phylogenesis' and 'ontogenesis.' First, how has the development of organic life proceeded, showing constantly, as it does, forms of greater complexity and higher adaptation? This is the phylogenetic question; and as we should expect, this is the question over which biologists have had their most earnest and lasting controversy. This is also the question that has mainly interested biologists. But the second question, the ontogenetic question, is of equal importance: the question, how does the individual organism manage to adjust itself better and better to its environment? How is it that we, or the brute, or the amœba, can *learn to do anything?* This is the question which has interested psychologists, so far as they have shown interest in genetic theories — an interest now greatly increased.

This latter problem is the most urgent, difficult, and interesting question of the new genetic psychology. How can an organism, whether with or without consciousness, ever, under any circumstances, get a new and better-adapted function? This is the inquiry which I wish to take up first, describing the only view which has much currency and criticising it. For in answer to this question there is practically only one theory in the field, that of Bain, in his latest formulation of which he shows its conformity to evolution requirements. It is based upon Mr. Spencer's earlier theory, but has certain modifications which Mr. Bain states in a passage which I quote below. I shall hereafter refer to the view now described as the 'Spencer-Bain theory.'

Mr. Bain's view is this: the organism is endowed with spontaneous movement, a certain spontaneity of action which must be assumed. Certain of these spontaneous movements happen by 'lucky chance' to succeed in bringing the organism into some special adjustment, better exposure, better protection, easier function, etc.; these movements are accompanied by pleasure. The pleasure lingers in the consciousness of the creature in connection with the memory of the particular movement which brought it; and the memory of the pleasure serves to incite the creature to execute the same movement again, whenever the same external conditions present themselves. The repetitions thus secured serve to fix the new adjustment as a permanent acquisition on the part of the organism.

It is evident that on this view of adaptation, Mr. Bain assumes consciousness with pleasure and pain in the organism and also assumes an association between the sense of the pleasure and the sense or mental picture of the movement which brought the pleasure. A third supposition should also be especially noted, — because it is usually so tacit an assumption as to go quite unremarked, — namely, that the circumstances or environment remain sufficiently constant to enable the creature to use the association between the pleasure and the movement. He must have various movements stimulated over again as before, and among them the one which before gave the pleasure, in order that the pleasant memory of this particular one may be suggested along with the other possible ones. Granting these assumptions, we have in the excess discharge a means of 'selecting' the useful movements.

The order of the 'factors of adaptation,' as we may call the elements involved in Bain's scheme, is clearly this: random movement, chance-accommodation, pleasure, memory of pleasure associated with memory of movement, adapted movement. In this order I wish to note especially the distinction between *adaptive* movement, *i.e.* the movement which by chance secures the accommodation, and *adapted* movement, *i.e.* the movement which follows by association when the pleasure is recalled in memory.

Passing now to Mr. Spencer's theory, we find a purely physiological construction.[1] He supposes that originally simple contractility of protoplasm leads to a diffused contractile discharge throughout the mass; this results in random movements of great variety. Some of these movements are by chance more adaptive than others, and by this fact a larger draught of energy tends to concentrate itself upon the channels of discharge which carry out these movements. This wave of 'heightened nervous energy' fixes an anatomical 'path of least resistance,' which so comes to represent the habits and permanent adaptations of the organism.

The coincidence of these two views may be best expressed in the terms of one of the authors. Mr. Bain writes:[2] "My leading postulates — Spontaneity, the Continuing of an

[1] Spencer, *Princ. of Psychology*, I., §§ 227 ff.

[2] *Emotions and Will*, 3d ed., 1888, pp. 318 f.

action that gives pleasure, and the Contiguous growth of an accidental connection — are all involved in Mr. Spencer's explanation of the development of our activity. . . . The spontaneous commencement is expressed by him as a diffused discharge of muscular energy (*Psychology*, Vol. I., p. 544). He considers that as nervous structures become more complicated, every special muscular excitement is accompanied by some general muscular excitement. Along with the concentrated discharge to particular muscles, the ganglionic plexuses inevitably carry off a certain diffused discharge to the muscles at large; and this diffused discharge may lead to the happy movement suitable to some emergency.

"This is the doctrine of Spontaneity in a very contracted shape; too contracted in my judgement for the requirements of the case. I have adverted to the inferiority of the diffused wave accompanying a central process, whether active or emotional, such as is here assumed. If another source of chance muscular movements can be assigned, and if that source presents advantages over the diffused discharge, we ought to include it in our hypothesis. . . . Mr. Darwin expresses what is tantamount to the spontaneity of movement thus: 'When the sensorium is strongly excited, the muscles of the body are generally thrown into violent action.' 'Involuntary and purposeless contractions of the muscles of the chest and glottis, excited in the above manner, may have first given rise to the emission of vocal sounds' (*Expression*, pp. 82, 83). This is spontaneous commencement under circumstances of strong excitement; but I have endeavoured to show that excitement is unnecessary, and that spontaneity is a fact of the ordinary working of the organs.

"The second indispensable requisite to voluntary acquisition, as well as to the consolidation of instinctive powers, is some force that clenches and confirms some successful chance coincidence. Mr. Spencer's view of this operation is given thus: 'After success will immediately come pleasurable sensations with an accompanying large draught of nervous energy towards the organs employed.' 'The lines of communication through which the diffused discharge happened in this case to pass have opened a new way to certain wide channels of escape; and consequently they have suddenly become lines through which a larger quantity of molecular motion is drawn, and lines which are so rendered more permeable than before.'

"Here is assumed the Law of Pleasure and Pain. Pleasure is accompanied by heightened nervous energy, which nervous energy finds its way to the lines of communication that have been opened up by the lucky coincidence. There is assumed as a consequence the third of the above postulates — the contiguous adhesion between the two states, the state of feeling and the appropriate muscular state. The physical expression given by Mr. Spencer to this result is, I have no doubt, correct — 'the opening up of lines of discharge that draw off large amounts of molecular motion.'"

Bain's three postulates, as here summed up by himself, touch the inevitable requirements of a theory, in my opinion, as will be seen from the foregoing pages. For there are three requirements: first, to get movements (his 'spontaneity,' as a substitute for Spencer's 'diffused discharge' and Darwin's 'purposeless contractions'); second, to get selections made from these movements (his 'accidental success,' of certain movements); and third, 'some force that clenches and confirms some successful chance coincidence' ('pleasure and pain,' identified with Spencer's 'heightened nervous energy which finds its way to the lines of communication that have been opened up by the lucky coincidence').

But it is evident that the truth — if it be true — of 'spontaneity' in developed organisms does not invalidate or even supersede Spencer's 'diffused discharge'; for the phylogenetic explanation of spontaneity — the question how did spontaneity itself arise — must rest on some such hypothesis as Spencer's theory of discharge, or of contractility in response to stimulation. So we may pass that postulate over without further question. But the second question comes: given movements — by either of these principles, both, or neither — how are some of them selected? Here, again, the answer comes from both authors: by chance adaptation. Of course, we are told, some of these random movements are likely to be more adaptive than others. Suppose the creature is suffering for want of food, the movements which hit upon food are then the adaptive ones. These are then in so far selected. This we may admit as most likely. But in how far — again it is asked — is the organism able to do them a second time? How are these successful, good, advantageous movements kept up? 'Pleasure and pain' is at once on everybody's lips, Bain's, Spencer's, *et al.* The adaptive movement gives pleasure: this secures the repetition. But, yet again, how? Evidently by association, we are told. The lucky movement gives pleasure; it is done again to secure the pleasure again, for of all the movements which are incipiently stimulated by the environment, that one which is remembered as having given pleasure, that one is done again. The movements must be incipiently stimulated, that is, the environment must be pretty constant, as was said above, for otherwise we may say: for an association one term must be given; either the pleasure to bring up the movement, or the movement to bring up the pleasure. We must have the presence of the movement in some kind of possibility, in order to get the sense of the pleasure to be derived from doing it. Here

Mr. Spencer's theory, on the organic side, gives us an answer; and Bain, as it seems to me, adopts it as a supplement, in the quotation made above from his third edition, directly from Spencer. "Here is assumed," says Bain, "the 'law of pleasure and pain.' Pleasure is accompanied by *heightened nervous energy*, which nervous energy finds its way to the lines of communication that have been opened up by the lucky coincidence."

But now we reach a point in the development of this theory at which difficulties begin to appear. It is evident that two cases are possible in the matter of the environment: the case in which the stimulus calling out the lucky movement continues to act, and the case in which this stimulus stops acting. Suppose it be light — sunlight — falling on a protozoön, and a movement results which exposes the creature better to the light, and this exposure is beneficial and pleasurable. It is clear that the sunlight may continue upon it, and so keep up its good influence; or, on the other hand, the sun may draw away and be succeeded by gloom. This theory, it is evident, makes the continuance of the adaptation dependent upon the continuance or repetition of the stimulus. How could the organism remember that it elongated itself by chance upward, let us say, in the light, and that this gave pleasure, if there be no longer any light to suggest the pleasure? If it do it in the dark, it again exposes itself to chance; for such an elongation in the dark may be the very reaction which will destroy it. So all *adaptive* reactions on this theory can be *adapted* reactions — real adjustments, acquisitions — only in conditions of relative regularity and frequency of stimulation.

This theory, therefore, leaves the organism to the risk of getting repetitions of stimulus by accident; just as it got the adaptation by the chance of a lucky movement, so it can keep it only by the chance of the recurrence of the stimulus. The organism waits the second time upon chance, just as it did the first time. The postulate that pleasure from the lucky movement is the agent of adaptation, succeeds, therefore, only when the environing agencies of stimulation are regular and constantly available.

This necessity of regularity of conditions is put by Mr. Joseph Jastrow in these words: "The existence of habits implies an environment sufficiently constant to repeatedly present to the organism the same or closely similar conditions."[1] And writers generally assume, if they do not say, that the organism is developed by the repetition of stimulations which storm it, by the laws of their own action, coming to act upon it while it remains in its place to be acted upon. Complexity of adaptation is then secured by the compounding of the reactions which are sustained in this way.[2]

Again, another question must be asked in regard to the postulate of 'heightened nervous energy' which both Spencer and Bain make the physiological counterpart of pleasure. The pleasure resulting from the first accidentally adaptive movement issues in a heightened nervous discharge toward the organs which made the movement, a discharge which finds its way to the same channels as before, and so makes it likely that the same movement will be repeated, the external conditions remaining the same. By these discharges this movement gets, of course, a better chance of being performed on subsequent occasions. So the organism fixes its adaptations.

Let us accept this and say that something equivalent to 'heightened nervous energy' alone can explain the repeti-

[1] *Popular Science Monthly*, November, 1892.

[2] More is said of this compounding tendency, below, Chap. VIII., § 4. Cf. Spencer's exposition of it, *loc. cit.*, Vol. I., §§ 231 ff.

tion of reactions which are both useful and pleasurable. We may call this, then, for convenience, the principle of 'Motor Excess,' and say that pleasure and pain can be agents of accommodation and development only if the one, pleasure, carry with it the phenomenon of 'motor excess,' and the other, pain, the reverse — probably some form of inhibition or of antagonistic contraction.

Our question then is this: What is the reason that the movements which are accidentally more adaptive than others, give pleasure? Is there anything in one movement, as such, more than another, that it should give pleasure? How can it matter to the protozoön, for example, whether it elongate itself upward, or flatten itself downward, that it should feel better in one case than in the other?

The only answer evidently is, that the pleasure is not in the movement in itself, but in what the movement gets for the organism. The protozoön may elongate itself upward without pleasure possibly in the dark, or with positive pain. The plant may turn upward only in the light (heliotropism), and then downward only in the dark (geotropism) to show its adaptations. It is the sunlight which the creature gets from its elongation upward that gives the pleasure.[1]

Yet that the current theory, as held by psychologists, makes the first adaptive movement accidental, and the pleasure which serves as agent of accommodation to result only from that movement, may be seen from such statements as the following from Höffding, who accepts Bain's postulate

[1] A case which fulfils the details of this illustration is to be found in certain shellfish (mussels) which respond variably to light and shade. Some species withdraw when shadows are thrown upon them; certain others withdraw when light falls on them; and yet others respond by contraction to both light and shade. See Nagel, in *Biol. Centralb.*, XIV., 1894, p. 385.

of spontaneity in developed organisms. He says: "There may be accommodation even before consciousness by means of *reflex movement.* In this, movement is not immediately brought about by the internal state, but by a stimulus from the external world, or from a part of the organism."[1]

As soon as it is criticised, this bald position becomes irrational, as every one will admit: for the action of the sunlight it is which stimulates the organic and vital processes, aids nutrition, sets the organism into its life rhythms, etc. This is universally the case. It is what the organism *gets by the movements or without movement,* that ministers to its life; that is the original pleasure-giving thing, not the mere fact of one movement rather than another.

And yet, as evident as this is, I cannot find it anywhere clearly brought out in the literature of this topic. It may have been taken for granted by every one, we could well believe, except that when we come to generalize this view, we find that the theory of adaptation takes on a meaning very different from that usually understood. If it is the organism's stimulations, such as food supply, contact with the oxygen of the air, equilibrium under the action of gravity, etc. — if it is such things which give the organic bases of pleasure — then these it is which serve to bring about the motor excess discharge and produce the abundance and variety of movements necessary to selection. But if so again, then we do not need the first accidentally adaptive *movement* to give pleasure, and through pleasure so to secure the excess discharge.

The old theory turns the case completely over and stands it on its head.[2] We reach, in fact, from this consideration a new construction in which our organism begins with a susceptibility to certain organic stimulations, such as food, oxy-

[1] *Outlines of Psychology,* p. 311.

[2] Cf. Spencer, *loc. cit.,* I., p. 545.

gen, etc.; these when present give pleasure; the pleasure is, physiologically considered, a heightened vitality in the central nuclear processes; this heightened, central vitality issues in a motor excess discharge; from the resulting abundant and varied movements of this excess discharge those are selected which bring more of these vital stimulations again; and these finally keep up the vitality of the organism, and by the repeated excess movements provide for constantly progressive adaptations.

This position, it is plain, does not rule out the old interpretation entirely — the view that it is the effect of accidentally adapted movements to give pleasure. For in saying that it is the stimulus or sense process which gives pleasure, according as it is vitally beneficial or not, I do not rule out any kind of stimulus or sense process. Muscular sensation — the sense process of accomplished movement — takes its place as one such process among others, and a very important one. In so far as the exercise of muscle in high organisms, or the mere fact of contractility itself in the lower, is vitally good, in so far it also gives pleasure, and this pleasure serves to issue in excess discharge to the same regions again. But this is a very different view from that which says that the excess movements corresponding to pleasure all follow from accidental movements which are lucky.

The Spencer-Bain view seems then to say that one kind of sense process, that which reports movements, and movements only of a particular kind — those which happen to be adaptive by chance — that this one kind of sense process gives pleasure, while all others do not. But why should this be? All processes of stimulation going into the organic centres ought to follow the same law. If one kind, in as far as it serves to heighten vitality, for that reason brings up the energies of the reacting centre to the pitch of a 'heightened nervous discharge,' why should not any other stimulating process which serves to heighten vitality do the same thing? And when we come to press the case more closely and ask why it is that only one class of movements — a logical class merely, those which happen to be adaptive — do in reality so act, the only practical criterion is after all, on this theory, just that which I am urging, *i.e.* that those movements only are adaptive which secure a new element of sense process, such as light, chemical action, food stimulus, etc., in addition to the ordinary advantage of movement itself which all movements, *qua* movements, have in common.

So far, we have spoken of pleasure, but the same holds, *verbis mutatis*, of pain. Let us ask this question: Where in the entire series of events constituting a reaction accompanied by pain — stimulus, central process, movement — does the pain come in, before or after the first adapted movement, *i.e.* the movement that has an inhibiting influence somehow upon its own further performance? The whole phraseology of Spencer and Bain would serve to make us think that it came in *only after a movement so unlucky as to be ill-adapted*, the pain being part of the effect of the movement, so that, by the memory of the pain thus got, the movement is in future inhibited. The pain got from the movement serves in memory to warn us not to repeat *the movement.*[1] But here I take issue blankly, contending that it comes in *by and in the stimulus* and *before* its discharge in movement, warning us not to move *so as to repeat that stimulus.* It is by this 'warning,'

[1] In support of this, see Spencer, *Prin. of Psych.*, Vol. I., §§ 227 f., § 232, § 237. Bain's view is seen in the quotation given above. Dr. Ward seems to be clear of this criticism, as regards the function of the pain-process, as actually issuing in movements which secure pleasure or bring less pain. I can get no consistent conception, however, from Ward, since he implicates attention even when, by express claim, he is discussing 'only the original evolution.' — *Encycl. Brit.*, Art. 'Psychology,' p. 73.

— which is in organic terms an actual lowering of vitality and consequent dampening of movement, or production of contrary movements, — that organism tends to avoid the repetition of this stimulation.

Let us take for scrutiny the customary illustration — the one which James uses, for example, in explaining the 'Meynert scheme' of nervous action. A child thrusts his finger in a candle-flame, and is burned: he thrusts no more, but shrinks. Here the doctrine of Spencer, Bain, and many others, seems to make the function of the pain the inhibition of the thrusting movement, as itself undesirable. But surely the case is very different. Is this movement in itself undesirable? Is it not undesirable *only under these or similar circumstances?* The inhibiting effect and the pain are brought about by the burn, and the recurrence of *that* — that is the thing to be prevented. The thrusting movement is a mere incident. Suppose the candle is brought up against the child instead of the reverse: it then shrinks just the same. But in this case there has been no forward movement giving a pain, by the memory of which, on the theory in question, the shrinkage or stoppage of thrusting is caused. No doubt the child has a habit of shrinking from pain-causing things; but what I claim is just this, that it is pain-causing *things*, not pain-producing *movements*, in reference to which it has acquired this habit.

So far therefore, let us bear clearly in mind, our outcome is this: we accept from the Spencer-Bain theory the fact of adaptation by selection from excessive movements, and also the view that the forerunner or cause of these excessive movements is a central process which is the organic analogue of pleasure;[1] but we raise an objection to that theory which

[1] Omitting the negative or pain side, which, apart from details, proceeds in a parallel way; cf. Chap. XVI., § 3.

seems to us insuperable: The objection that it makes this pleasure, and through it all adaptation, result from one kind of sense-stimulus, that of the organism's own contraction, and not from others, with no ground whatever for this discrimination against the ordinary stimulations of the environment, such as light, heat, oxygen, food-supply, etc., which are *from the first* most vitally necessary for all growth.

To obviate this objection we must hold that all stimulations which heighten vitality give the organic basis of pleasure and by this issue in excessive movements. This seems natural, easy, and in fact inevitable. This is what our theory does. It says: given any reason for a better central organic state of things, this better state of things shows itself, by the law of dynamogenesis, in the greater ease, facility, and variety of movements, which facilitate the adjustments and so the adaptations of the organism.

This is the first innovation which the theory which I have sketched above proposes. While securing the better basis for adaptation generally, however, this does not interfere with the function of pleasure which Bain desiderates — *i.e.* "some force that clenches and confirms, some successful chance coincidence" [1] [of movement]. For as I have said, the successful chance coincidence would still give pleasure and the same association would hold between this pleasure and the particular movement which secured it. And under regular conditions of stimulation this association would suffice to draught off the increased energy of the pleasure process into the channels of the movement which is associated with the pleasure; for the organic basis of an association must be some kind of a connective pathway between the seats of the things which are associated.

A later utterance of Bain's comes nearer, as far as I am

[1] See the quotation from Bain above.

sure that I understand it, to the recognition of this view of the general value of pleasure and pain in the theory of organic accommodation. He says in his last edition:[1] "The law that a movement bringing pain tends to be arrested, and a movement bringing pleasure to be promoted, is with some plausibility referred to a general principle of nervous action, whereby, seeing that pleasure is in so many cases associated with increase, and pain with diminution, of vital energy, there should grow out of this circumstance a disposition of pleasure to feed, and of pain to sap, its own producing energy [by an adaptation of movements by which the stimulation giving pleasure is retained, on one hand, and that giving pain broken with, on the other hand]. There is an undoubted consistency between the two sides of our being on this hypothesis [of what we have called an 'imitative' or 'circular activity']. . . . The hypothesis in question demands for its adequacy a far-reaching, although not incredible or impossible, assumption — *viz.*, that the tendency of pleasure, through the medium of its physical accompaniments, to heighten for the moment the activities of the framework in general, somehow finds a way to concentrate upon the specific movement adapted to the precise case [*i.e.* adapted to bring the organism into continued relation to the pleasure-giving stimulus]. This is a very large demand in itself and would seem to need a large number of chance experiments [or a congenital variation producing a bifurcate division of movements into 'expanding' and 'contracting' respectively] before the lucky coincidence is reached. The hypothesis is by no means impossible . . . its natural place is under the hypothesis of Evolution, where it is an important, if not indispensable, item."[2]

[1] Bain, *Senses and Intellect*, 4th ed., 1894, pp. 328 f.

[2] I think it well to say that Professor Bain in a private letter wrote me that

We now find ourselves introduced to another class of facts, which, when interpreted, lead us to suggest another modification of the theory of adaptation.

It is evident that we have been dealing with the question of ontogenetic adaptation so far, the question as to how the individual organism manages to get new adaptations. Later on we may ask how the species can profit by the accommodations secured by the individual. But when we come to view the general fact of race adaptation as a whole, the question which we have just been discussing takes on a further interest.

It has been needful to assume that in the simplest organic forms which have contractility, and which are able to adapt themselves by their movements to their environment — that in such forms the analogue of pleasure is a central excess process which discharges itself in movement. The question for phylogenesis, then, which comes upon us is this: how did this condition of things arise, and what form must we hold these excess movements to take?

This question Mr. Bain seems to beg. His principle of 'spontaneity' is his starting-point; and he does not see that spontaneity must, as has been said above, itself be construed in terms of some form of process which accounts for an organism's expenditures of energy derived from such stimulations as its food-processes, etc. Höffding says in reference to the fact of spontaneity:[1] "The internal changes, which

he was taking account of my article on 'Imitation' in *Mind* (January, 1894). As he makes no reference, however, to my paper in his book, I may be wrong in thinking this to be a passage in which he had my article in view. I may even be wrong in thinking that the 'hypothesis' he speaks of is capable of being interpreted in the way I have done in the additions made in brackets in the text. In that case, the quotation may be read simply as a further exposition of my own views put largely in Professor Bain's words.

[1] *Outlines of Psychology*, p. 309.

set free potential energy, must, in their turn, depend on the function of nourishment. The spontaneous movement of living creatures is possible only because life itself is an uninterrupted process of taking in and using up certain constituents. Absolute spontaneity would be a consumption of one's own fat." It is evident that Bain never brings the genetic point of view into his theories, except by the merest attempts at grafting the evolution idea upon the trunk of his analysis of the actions of developed organisms.

Mr. Spencer, on the contrary, does attempt to account for the rise of the heightened nervous process in individuals. He considers it a concentration of the energies of reaction into particular pathways; and so, indeed, it must be. But to him, also, it is an ontogenetic acquirement. It follows upon the first lucky adaptive movement, as we have seen above.

This account we now see to be inadequate, since it assumes, as has been shown at length, that when certain stimulations are present — stimulations covered by the vague word 'adjustments,' which the lucky movement happens to strike — these stimulations serve by their action to heighten the central processes. So the whole question remains quite unanswered as to why any stimulations do thus heighten the central processes, and so give an excess discharge in movement. Of course, the answer seems to be that those processes of stimulation do this to which the organism is already accommodated — those under the action of which it has come to be what it is — its food-supply, oxygen, chemical agents, gravity, contacts, etc., etc.

The general fact of adaptation by chance adjustments occurring among excessive diffused movements is, of course, true — that I have exemplified above in the theory of the rise of handwriting.[1] What is not accounted for on the

[1] Chap. V., § 2.

current theory is just the spontaneous or excessive movements, from which the selection is made. These, in my view, are due to the heightened central processes excited by vitally appropriate stimuli. This seems so elementary and simple that it would not be worth while to speak further of it were it not for another fact, to which we may now revert.

Biologists find among the first adaptations of the organisms, the earliest in the phylogenetic series — in the minutest bacteria, the most formless protozoa, the unicellular creatures of a day; in plants, in all life — a certain fundamental difference of movements. All organisms behave in two great and opposite ways toward stimulations; they approach them, or they recede from them. Creatures which move as a whole move toward some kinds of stimulations, and recede from others. Creatures which are fixed in their habitat expand toward certain stimulations, and contract away from others. It is very evident that if this be true, the very uniformity of the relation entitles it to a place in any theory of development. And the question at once arises: why is it that we find these two well-marked differences in behaviour in each organism, whatever its type and place in the scale of animate nature? [1]

Now if we assume this to be a fact in nature — I devote an entire chapter further on to the consideration of the facts, under the phrase 'Organic Imitation' — that an organism tends to approach, move, strain, toward certain stimulations, and away from others, it becomes easy to connect the fact with our former account of development, and to

[1] "Coextensive with the phenomena of excitability — that is to say, with the phenomena of life — we find this function of selective discrimination — this power of discriminating among stimuli and responding to those which are the stimuli to which responses are appropriate." — ROMANES, *Mental Evolution in Animals*, p. 51.

hold that the stimulations which the organism tends toward are those which heighten its vitality, which give it pleasure, and those from which it draws back are those whose effect upon it is the contrary — the damaging, the painful ones. This is on the surface the most natural thing in the world for nature to do — to endow her creatures with a great power of self-preservation and self-improvement. An organism does not have to wait for a pleasure to come along, but after it has once had it, it can go out after it; nor to remain exposed to a pain, but after once experiencing it, it can retire with discretion.

This follows in such simple order from what we have found to be the method of adaptation — in each case by a movement whose adjustment consists just in its appropriateness to secure a good stimulation — that the facts of biology which show this first contrast in movements are only what we would expect. And they tend in so far also to confirm the earlier view as to the method.

Coming to interpret this new result, therefore, we see that our early random, spontaneous movements are not only relatively random or spontaneous. The ontogenetic growth of the individual at any race stage starts with this fundamental adjustment of movements to the stimulations under which the phylogenetic development has so far progressed. And it is only a statement of the law of phylogenetic development to say that this antithesis of outward movements, expansions, on one hand, and withdrawing movements, contractions, on the other, is due to natural selection working among organisms; the first application of natural selection spoken of above in the introductory sketch of the theory of development.[1]

[1] We have the authority of Mr. Spencer for making the ability to move toward or away from an object a sufficient cue to the operation of natural selection, *i.e.* in the development of the bilateral nervous system and the

So when we come to consider phylogeny and ontogeny together we find that if by an organism we mean a thing merely of contractility or irritability, whose round of movements is kept up by some kind of nutritive process supplied by the environment — absorption, chemical action of atmospheric oxygen, etc. — and whose existence is threatened by dangers of contact and what not, the first thing to do is to secure a regular supply to the nutritive processes, and to avoid these contacts. But the organism can do nothing but move, as a whole or in some of its parts. So then if one of such creatures is to be fitter than another to survive, it must be the creature which by its movements secures more nutritive processes and avoids more dangerous contacts. But movements toward the source of stimulation keep hold on the stimulation, and movements away from contacts break the contacts, that is all. Nature selects these organisms; how could she do otherwise?

This, too, is consonant with all that we know of growth. Increased vitality tends to enlargement, range of movement, activity; while lessened vitality and organic decay tend to the opposite series of effects, *i.e.* shrinking, contraction of range, torpidity.

system of antagonistic muscles (*loc. cit.*, I., § 233). But he entirely fails to see that the same thing is done by the minute creatures which swarm to red light and away from blue light, although they have no nervous or muscular systems at all. Dr. Ward also appeals to natural selection in discussing this subject as follows: "At first when only random movements ensue, we may fairly suppose both that the chance of at once making a happy hit would be small and that the number of chances would also be small. Under such circumstances natural selection would have to do almost everything and subjective selection almost nothing. So far as natural selection worked we should have, not the individual subject making a series of tries and perfecting itself by practice, but we should have those individuals whose stuff and structure happened to vary for the better, surviving, increasing and displacing the rest." — *Encycl. Brit.*, Art. 'Psychology,' p. 73.

We only have to suppose, then, that the nutritive growth processes are by natural selection drained off in organic expansions, to get the division in movements which represents this earliest bifurcate adaptation. Then inside of this group of expansive movements — 'spontaneities' or 'heightened discharges' — it becomes the sphere of ontogenetic growth to secure the further refinements of adjustment which the phenomena of 'excess' — now identified both with pleasurable experience in consciousness and with motor discharges giving outreaching movements — enables the organism to secure.

Finally, we found the Spencer-Bain theory to make one other presupposition. It requires a relatively constant, unchanging environment, in order to give the repetitions of stimulation which development requires. The organism is supposed to be battered, stormed, by repeated stimulations of the same general kinds. In this, the purely biological theories of development concur; by which I mean those theories which do not call in the pleasure-pain process at all, but rely simply upon the repetition of stimulations and reactions, and the resulting compounding of processes which these repetitions are supposed to give.

It is now evident that our theory renders the organism much less dependent upon such regularity and constancy in the environment. Creatures which have, in their own method of reaction, a way of reaching after the stimulations which they need — a way of retaining contact with the source of supply, say of food, or oxygen, or sunlight, or heat, or of increasing their forces by actually moving toward it, these creatures can, in a measure, find or make for themselves the regularities which the environment may not guarantee.[1] So, also, can they by their natural capacity of

[1] Think, for example, the difference it makes in the possible time required for the evolution of sense organs such as the eye, if we allow the organism

withdrawing from what is pain-giving, avoid and escape harmful things to which they are, perchance, constantly exposed. It is possible that the faculty of local movement, locomotion, possessed by animals, in contrast with plants, is simply a further emphasis of this very useful distinction in reactions. This follows, indeed, of necessity, when we come to see below, that the system of 'antagonistic' muscles is a product of just this original contrast of reaching and withdrawing movements.

When, further, we come to mental development proper, in later chapters of this work, we will see that this is exactly the method of that highest of all functions of accommodation, adaptation by volition. When we *will* to escape that which is brought upon us by the regular laws of nature, we simply adopt means of withdrawal from it by anticipation; and, on the other hand, we secure those pleasant and beneficial experiences which the environment of our lives would not, in itself perhaps, have brought us by *willing* to go out and find them.

It is evident from what has now been said, that the fundamental difference between this theory and that criticised above concerns the *first organic adaptation*. On our theory, the first adaptation is *phylogenetic; i.e.* it is a variation. By the operation of natural selection among organisms, those survive which respond by expansion to certain stimulations of food, oxygen, etc., and by contraction to other certain stimulations; this expansion gives, by reason of the new stimulations which it brings within range, a heightened central process which is the organic basis of the hedonic consciousness; and this issues in the varied excess movements from which the ontogenetic adaptations of the indi-

a form of reaction which moves it toward the source of the light stimulation. Cf. Spencer's doctrine on this point, *Psychology*, I., §§ 231 f.

vidual organism are selected by association, as fitted in turn to perpetuate the stimulations which give pleasure, and so again to arouse the excess process, and so on.

The current Spencer-Bain theory, on the contrary, holds, as I understand it, that the first adaptation is *ontogenetic; i.e.* it is due to accidental adjustments occurring among diffused or spontaneous movements of single organisms, these adjustments giving a heightened central process which is the organic basis of the hedonic consciousness, and which issues again in excess movements from which again further adjustments are selected by chance; these adjustments all being made permanent by the association between the idea of the movements thus giving pleasure, and the memories of the pleasure which they give.

With these criticisms, the outline of the theory of development stands out clearly enough, I think. We may now go on to show briefly that the theory would not be affected by the truth or falsity of either of the opposed views of heredity now so bitterly opposed to each other in biological circles.

§ 3. *Development and Heredity*

No theory of evolution is complete, in general opinion, which does not account for the utilization in some way, from one generation to another, of the gains of the earlier generations, turning individual gains into race gains. I wish, therefore, to inquire briefly what treatment the view of development held above has a right to expect from the two current theories of heredity.

The neo-Darwinians hold that natural selection, operating upon congenital variations, is adequate to explain all progressive race gains. This theory, therefore, is able to dispense with the ontogenetic acquirements of the particular organism.

It accordingly denies that what an individual experiences in his lifetime, the gains he makes in his adaptations to his surroundings, can be transmitted to his sons.

This theory, it is evident, can be held on the view of development sketched above. For, granting the ontogenetic progress required by the Spencer-Bain theory and adopted in my own, — the learning of new movements in the way which I have called 'functional selection,' — yet the ability to do it may be a congenital variation. Indeed, I have made the excess process itself, which gives the movements from which 'functional selection' selects the fittest, together with the great antithesis of expansions and contractions with pleasure and pain, just such variations seized upon by natural selection. And all the later acquirements of individual organisms may likewise be considered only the evidence of additional variations from these earlier variations. So it is only necessary to hold to a view by which variations are cumulative to secure the same results by natural selection as would have been secured by the inheritance of acquired characters from father to son. Mr. Spencer and others seem to me to be quite wide of the mark in saying that the only alternative to the inheritance of acquired characters is a doctrine of 'special creation.' The life history of the mammal embryo shows us, as a matter of fact, as we have already seen, a single creature going through many of the variations of the race series, without giving us the actual life history of the beings which in their lives represented any single one of these stages. As Balfour says:[1] "Each organism reproduces the variations inherited from all its ancestors, at successive stages in its individual ontogeny which correspond with those at which the variations appeared in its ancestors." The embryological record emphasizes the vari-

[1] *Comparative Embryology*, p. 3.

ations, not the means by which they were produced, nor their detailed organic outcome in particular generations.[1]

The problem which is left on the hands of the neo-Darwinian, therefore, is to construct a theory of variations. The 'why,' the 'how much,' the 'in what direction,' of variation — these questions he must answer. And, of course, the burden of proof lies on him to show that his adversaries have not correctly answered the question of 'the how' of variation by their hypothesis of the transmission of acquired characters.

It is not as generally seen, however, that the only way that such a theorist can answer these questions is by an actual examination of existing variations both as to the facts of their existence and of their modes of development. He must recognize all the processes of the development of the individual in order to define the variation which rendered these results possible in the life of the individual. This is what gives value to the Spencer-Bain theory, considered as an attempt to define the actual ontogenetic process of accommodation. On the basis of that theory we may ask the question, therefore, How can functional selection — individual growth in accommodation — be efficient? What is the neurological process seen in it and what kind of congenital variations does the presence of this process presuppose and also by screening and supplementing — as 'Organic Selection' supposes — serve to accumulate?

The theory of individual accommodation, accordingly, comes first as a matter both of fact and of interpretation, and should be treated quite apart from the problem of heredity. We are justified accordingly, from the point of view

[1] And this emphasis is made more emphatic, possibly, in the light of the 'discontinuous variations' recently discussed by Bateson and De Vries, and earlier pointed out by Darwin, and by Galton under the name of 'sports.'

of the neo-Darwinian theory, in attempting to answer it in the preceding pages.[1]

The same is true also from the point of view of the neo-Lamarckian theory of heredity, as is evident; for just such examination and interpretation of the facts of individual experience and development supplies on this theory the very means and method of interpreting hereditary race progress. Granting the inheritance of acquired characters, of course the biologist then asks: Well, what has the individual at each stage been able to acquire, and how did he acquire it? This is what we have been attempting to answer above.

It is being gradually recognized by biologists that the requirements of theory are equally well served by either theory, which means that facts alone can refute either theory. Whatever a particular creature may be endowed with, he might have got in either way—or in both together. Instinct, for example, may be held to have a twofold origin; it may have arisen in some cases by the natural selection of creatures having accidental reflex adaptations, and in other cases by intelligent adaptation. And both processes can be construed without supposing the inheritance of acquired characters; for the ability to make intelligent adaptation may be considered as itself a variation, by which congenital adaptations have been fostered.

I should say, therefore, that, supposing the analogue of the pleasure-pain process is in all cases the actual evidence and accompaniment of the excess process from whose discharges adjustments of movement are secured, then either of two further views may be held. Either on one hand the pleasure-pain process is a variation (and with it, the actual hedonic consciousness), the environment of the individual in

[1] The further carrying out of this form of Darwinism is to be found in the volume *Development and Evolution.*

each generation simply serving to give it scope for special accommodation ; or on the other hand, this process itself is a functional selection, a thing acquired by the individual in his experience. But in either case, the pleasure-pain process *is the same and performs the same functions;* both are exactly what the facts show them to be. From the organic side and without reference to consciousness, it is what the biologists call 'plasticity.'

In the foregoing pages I have seemed, however, to find reason for saying that the pleasure-pain process, with its antithesis of outward and inward movements, was due to natural selection, that is, that it was phylogenetic in its origin. Further considerations may now be adduced quite apart from the general question of heredity. We are in fact brought here face to face with the question of the origin of consciousness, and upon this one is able to express only very hypothetical opinions.

§ 4. *The Origin of Consciousness* [1]

The foregoing paragraphs seem to give us some indications of the relation of consciousness to the phenomena of life. We have found it necessary to hold that the physical basis of hedonic consciousness — the fact of heightened central vital processes issuing in expansive movements — is a variation of phylogenetic origin in primitive organisms, rather than an acquisition due to adjustment secured in the life-history of particular organisms. The original bifurcation of movements, as outreaching and retiring, I have described as a phylogenetic distinction and product; a variation among the earliest contractile forms. Some arose by variation

[1] In the French and German editions sections are inserted here on 'Organic Selection' and 'Determinate Evolution,' topics now fully treated in ***Development and Evolution.***

which did discharge their increased vitality in expansive movements, and by the advantage of it lived longer and propagated more.

It is possible, however, to hold a different view; in fact, we have found the ordinary Spencer-Bain theory of adaptation doing so. On this view the heightened central process is an adaptation secured in the lifetime of the creature. On this view, further, it is necessary to suppose that all stimulations, including those of nutrition, varied in their effects upon the organism from enlargement, expansion, etc., in some instances, to diminution, contraction, etc., in other instances, in the same organism. Mr. Spencer does indeed attempt to give a purely mechanical deduction of the association between withdrawing movement and pain,[1] making it arise in the 'experience' of uniform contractile tissue. In that case, ontogenetic adaptation precedes phylogenetic, and if we bring in consciousness at all, we should have in such a creature an association between the pleasure of the success of certain expansive movements which were also adaptive, and the sense of the movements themselves.

This, it is evident, makes consciousness of pleasure and pain arise at some point in the creature's life; just where, we have no clear answer from Spencer. But if we say that uniform contractile tissue did not have consciousness before the heightened process which indicates pleasure, and that this heightened process is due in some way to accidental adjustments of movement; then consciousness must have arisen by means of these adjustments.

But we have seen that adjustments of movement can have no meaning for the organism, except as they bring certain vital stimulations. So the rise of consciousness after all would seem to be due to the influence of these vital

[1] Spencer, *loc. cit.*, I., § 227.

stimulations. And when we come to ask why these vital stimulations are vital, why they are necessary, that is, we appeal at once to the habits,—the very constitution of the life process itself,—all of which must have come to the particular organism by heredity. So consciousness becomes, after all, in its actual rise a phylogenetic product.

Looking at it from this phylogenetic point of view, as a variation, we find difficulties and certain advantages. Romanes, it will be remembered, treats the fact of 'selective contraction' as the 'criterion of mind,' the indication of the presence of consciousness;[1] and, inasmuch as he also finds this fact of selective contraction in the lowest known living creatures, it would seem in his view to be due either to selection, in case we suppose still earlier a uniform contractile tissue, or as a part of the 'general mystery of life,' in case we do not.

The difficulty, however, which he sees to the 'selection' view, he states in this way: "The difficulty is that I began by showing it necessary to define mind as the power of exercising Choice [selective reaction], and then proceeded to define the latter as a power belonging only to agents that are able to feel. . . . It seems that my conception of what constitutes Choice is in antagonism with my view that the essential element of Choice is found to occur among organisms which cannot properly be supposed to feel. This . . . contradiction is a real one, though I hold it to be unavoidable. For it arises from the fact that neither Feeling nor Choice appears upon the scene of life suddenly. . . . There are two ways of meeting the difficulty. One is to draw an arbitrary line, and the other is not to draw any line at all, but to carry the terms down through the whole gradation of the things until we arrive at the terminal or root principles.

[1] *Mental Evolution in Animals*, Chap. I.

By the time that we do arrive at these root principles, it is no doubt true that our terms have lost all their original meaning."

The difficulty is, in short, that we have two horns of a dilemma: either (1) Consciousness with feeling of pleasure and pain are coextensive with life; in which case they existed before the selective reactions which are said to be the criterion of consciousness. For — to put this alternative in terms of my own foregoing explanations — the same stimulations of nutrition, etc., which are now said to explain the increase of the central processes, upon which consciousness is based, must have been vital to life before this so-called variation arose. Why then did not the uniform living protoplasm, which preceded the variation, itself have consciousness? Or, the second horn of the dilemma, (2) Consciousness with feeling of pleasure and pain are quite useless appendages to the theory of adaptation and are in no way accounted for; since the variation which secures the first adaptation, that is, the selective reactions said to be the criterion of mind, are simply variations in processes of nutrition, etc., which must have existed in earlier living matter, if it existed, and may exist in much higher forms of living matter, in which we have no evidence of such a thing as feeling of pleasure or pain.

Romanes thinks it is best to draw no line at all between life without and life with consciousness, but to say that, as we descend in the scale, terms like feeling, which imply consciousness, are gradually eviscerated of their meaning; and he is probably right. But he does not see that even then there are two remaining alternatives. We may say, to state one of the alternatives first, that life existed before selective reaction; in which case — holding that mind is coextensive with life — he must give up his criterion of mind. This, I think, he does substantially, adopting, somewhat hesitatingly it is true, the Spencer-Bain view of the origin of adaptations by accidental movements during the lifetime of early creatures. He says,[1] "How are we to explain the fact that the anatomical plan of a nerve centre . . . comes to be that which is needed to direct the nervous stimuli into the channels required? The answer to this question we found to consist in the property which is shown by nervous tissue, to grow by use into the directions which are required for further use. This subject is as yet an obscure one, *especially when the earliest stages of such adaptive growth are concerned*, but in a general way we can understand that *hereditary usage*, combined with natural selection, may have been alone sufficient, etc." (italics mine). Furthermore, he presents an argument for the ontogenetic view of the rise of selective reactions in saying,[2] "It is impossible that heredity can have provided in advance for innovations upon or alterations of its own machinery during the lifetime of a particular individual." The inference being that if such innovations cannot be provided for by heredity (variation), they must be acquired during the lifetime of the creatures. This argument is worthy of discussion and is taken up again: but it is not necessary to dwell upon it here, inasmuch as it does not conflict with the possible truth of the second alternative, which is still open.

This second alternative — really a third one in relation to the horns of the original dilemma presented to the mind of Romanes — is this: we may say that life began with selective reaction as part of its original endowment, and with consciousness withal, that is, with feelings of pleasure and pain.

This position preserves the criterion of mind, making it also the criterion of life, and so assumes a common phylogenetic

[1] *Loc. cit.*, p. 60.

[2] *Loc. cit.*, pp. 20 f., quoting from his own work on *Animal Intelligence*.

beginning of both life and mind in one. This seems to me to be required not only by the logic of criteria but also by the facts of life.[1]

In what sense we are able to call this a 'variation' is, of course, open to dispute. It is certainly a variation in nature —this tremendous thing, life, made more tremendous as being the vehicle of mind. But is it not more simple than the other horn of the dilemma; hat which requires the assumption, first, of life without consciousness, and then, a little later on, the further assumption of consciousness in connection with life?

But more positive advantages come, it is to be hoped, from the foregoing considerations. It has been shown that the theory of biological adaptation cannot dispense with a factor which is, from all accounts, — taking biologists like Romanes to witness, — the physiological analogue of pleasure and pain, and that nowhere can a beginning be found for this in the life series. When we come further to see that all stages of mental accommodation and development can be construed by the same principles of adaptation — a task to which this book is mainly devoted — it would require some temerity of dogmatism or some strong evidence to the contrary to lead one to throw away such an extension of the principle of uniformity in nature. And yet, with the two great exceptions, Spencer and Romanes, I know of no biologists approaching the first rank, who have attempted to bring the phenomena of mental development — the class of facts most open to scrutiny and most important everywhere in the animal series — and those of organic adaptation, under the terms of a single concept.[2]

[1] This view is the 'growing' one among biologists (*e.g.* Minot, Ll. Morgan, etc.). It had early statement by Lewes.

[2] This statement is happily no longer true.

§ 5. *Outcome: Habit and Accommodation*

Returning upon our path we are now able to see that two great truths stand out in all development; two truths both of which are based upon the general fact of contractility or reaction, and which, therefore, take us farther upon our way.

The organism tends to repeat what it has already done; this all theories of development agree upon, the biologists, the disciples of Spencer, the advocates of the association theory of Bain, the psychologists. The fact of repetition is admitted to be the corner-stone of all theories; and all theories go farther in naming the principle which such repetitions illustrate, the law of Habit.

The formulation of the principle of habit, however, must depend somewhat upon the sort of notion we entertain of contractility, of the way which the organism takes to get its repetitions. If we hold that habits are distinctly due to the repetition of motor discharges, — that is, to the second, third, fourth performance of *contractions*, as the Spencer-Bain theory tells us, — then no habit can be formed as such, or can be begun to be formed until *after* a first contraction has opened the way for the passage of the contracting energy into the same channels of discharge a second, third, fourth time. The formulation of the principle of habit on this theory takes on, then, something of this form — its usual form — *i.e.* Habit expresses the tendency of an organism to repeat its own movements again and again.

Enough has been said, I think, already to show what criticism ought to be passed on this formulation. It means that the organism starts with nothing equivalent to habit, with no native tendency to any kind of movement, with no teleology in its movements, no ulterior organic ends. It further gives no criterion as to what kind of movements it is desirable the organism should get into the habit of performing. It makes the movements necessary to the creature's life on a par precisely with all other movements, while yet admitting that it is only by appropriate movements that the organism could have got life processes at all. It gives the organism no preferences for its food, its oxygen, the stimulations in the presence of which alone life itself would be possible; for such preferences would have to show themselves as organic tendencies to some kind of differential movements.

Coming to supply this lack, as we have endeavoured to do in the preceding pages, we find it necessary to consider that the repetition of movement is not at all what the organism is after, nor indeed is it what the principle of habit rests upon. It is not true that all movements are 'equal before law' — the law of habit. Movements which cause pain do not tend to be repeated. They are exceptions to the law of habit, as that is usually formulated. Painful movements are inhibited, they tend to be reversed, squelched, utterly blotted out; how can this be explained on the foregoing formula for habit? It cannot be explained. And yet it is found to be a fact in the lowest living creatures that the biologist knows.

So just as in starting with life we have to start with some process characteristic of life, — say nutrition alone, if you please, — so we have also by the law of dynamogenesis to start with tendencies to movements which are the manifestations of life, and are, in so far, special. And the object of these movements is the maintenance of life: which is only another expression, as we have found reason to believe, for the maintenance of the stimulations necessary to life. So we reach another formulation of the principle of habit which reads something like this: Habit expresses the tendency of an organism to keep in touch, by means of movement, with beneficial stimulations; or if we summarize under a single word the character of the movements toward which all habits of the organism tend, we may say, *Habit expresses the tendency of the organism to secure and to retain its vital stimulations.*

On this view, a habit begins *before* the movement which illustrates it actually takes place; the organism is endowed with a habit, if that be not considered a contradiction. Its life process involves just the tendency which habit goes on to confirm and to extend. The process of habit, having as its end the maintenance of a condition of stimulation, is set in train by the initial stimulus. And the discharge of it in the path which again 'hits' the stimulus is the function of this stimulus rather than another, and reflects, exactly and alone, the fact that then and there is a stimulus whose influence upon the vital processes is good.

Here at the very origin of the things of life, therefore, we find the 'circular process,' what I am going on to describe as the physical basis of 'imitation.' And the law of habit is simply a generalization, all the way through the facts of biology and psychology, from the various applications of this principle.

The other great principle, on which the foregoing discussions serve to throw some light, is that of Accommodation, as it is best to call it in psychology as well as biology. Let us see how it may be put in contrast to that which is called habit.

We have had occasion to ask in detail how an organism can accommodate itself, and have already discussed various answers in equal detail. Our outcome may be briefly stated, apart from the consideration of habit, somewhat in this way: *An organism accommodates itself, or learns new adjustments, simply by exercising the movements which it already has, its habits, in a heightened or excessive way;* the accommodation is in each case simply the result and fruit of the habit itself which is exercised.

This is clear when we remember that on our new conception of habit every act prompted by habit is an act of attaining a beneficial stimulation or experience; now the result of every attainment of a beneficial experience is to discharge an excessive pleasure wave of movement from which new adjustments are selected by the same criterion; that is, by the enriched stimulations or experiences which they in turn secure. So these later adjustments are accommodations. Each such accommodation is reached simply in the ordinary routine of habit, and is its outcome.

How simple this view is in the whole range of facts becomes evident in the notice of various of its applications in subsequent chapters. It seems to allow us to see nature moving smoothly, instead of being compelled, as we are so often compelled, to consider a new thing, a novelty in nature, an invention, a new adaptation of means to end — to consider each of these as involving a great wrench of nature from the methods of her usual working! Let us say, once for all, that each new action is an accommodation, and every accommodation arises right out of the bosom of old processes and is filled with old matter. Does not the one kind of 'circular' reaction in which, as we now see, habit and accommodation meet on common ground, enable us to see how this may be true?

Finally, coming once again to the topic of heredity, let us restate the objection made by Romanes to the view that life may begin with differential reactions, or that such differential reactions could not be variations preserved by natural selection. He says, in a passage already quoted in part:[1] "Does the organism learn to make new adjustments, or to

[1] *Loc. cit.*, pp. 20 f.

modify old ones, in accordance with the results of its own individual experience? If it does so, the fact cannot be due simply to reflex action in the sense above described [*i.e.* repetitions of old reactions under the law of habit]; for it is impossible that heredity can have provided in advance for innovations upon or alterations in its own machinery during the lifetime of a particular individual."

This difficulty, as we saw, led Romanes to throw over his own criterion of mind, and to hold that all adaptations, including those selective reactions which he had made characteristic of mind, were reached in the lifetime of individuals. Further, this position, if true, would lead inevitably to a Lamarckian theory of heredity, which indeed Romanes held; for if no hereditary variation can provide for future adaptations, then no past adaptations can have been provided for by variations to which they were future, and so all actual adaptations must have arisen by use, heredity being solely the bridge of transmission from father to son.

But we are now able to see, from the results we have reached, not only that there is another alternative, but also that this statement of Romanes is not correct. The other alternative is that life began with a habit, the very method of which does include a process which provides for the continual modification of its own results.

If we accept this alternative, then I have shown how new adaptations can be secured inside of this habit. But if we do not accept it, preferring to believe with Spencer in a form of earlier life which showed quite formless and diffused contractions, we are able still to see how such a pseudo-habit may have come about as a variation. The only necessary feature of this variation would be that nutrition increase expansive and varied movements; that is all. The result would be that the stimulations affording nutrition would be hit upon and gained oftener by these organisms than by others, and so a habit of getting greater variety and richness of such stimulations in this way would be secured, and new accommodations made which would break up the habits transmitted by heredity. Would not this be just the state of things which Romanes declares impossible? — heredity providing for the modification of its own machinery? Heredity not only leaves the future free for modifications, it also provides a method of life in the operation of which modifications are bound to come, and further — and this is the most interesting fact in the whole case — it provides that these modifications shall take place inside the great twofold accommodation of movements corresponding to pleasure and pain, thus making the very fact of accommodation itself the great deep-seated *habit* of organic life.

CHAPTER VIII

The Origin of Motor[1] Attitudes and Expressions

§ 1. *General View*

In ordinary usage, the word 'expression' stands for a passably definite thing. We mean, when we use it, to say that the signs, which we see in face, attitude, deportment, etc., of a man or beast, *mean something;* and that this meaning is what the mental process or state of the individual or creature under observation really is, or what he really intends to have us take his state to be. He expresses something to me when I gather from certain signs about his body, such as those I have mentioned, certain facts to be true about his mind or consciousness. The phrases, 'facial expression,' 'verbal and rhetorical expression,' 'emotional expression,' etc., all have this common idea at bottom.

Just as soon as we have come to ask how expression is possible, how it comes that these external signs can be trusted to convey the truth about the mind which lies within, we see that a whole philosophy of development is required to give us an answer; a philosophy of the development, that is, of mind and body together. It will not do to give an explanation simply of one mental state, like grief, expressing itself in one group of signs, like weeping; that might be solved by saying that the body had been created for just this use by the mind. But when we come to see that all possible mental states

[1] The word 'motor' is used to include the effects of 'efferent' process generally, not those of muscle contraction alone.

have their appropriate signs, all in a system, and that each animal consciousness has a system of signs, and all the same system, then we have to account not merely for the single cases, but for the *system*, as a system. And this is a very different matter.

Let us take, for example, the facts of suggestion as they have been set forth above. Suggestion we found to involve a gradual series of changes, transitions, stages, in the action, behaviour, attitudes of the child, according as he experiences changes, transitions, stages of treatment and stimulation from his surroundings. All his signs or expressions are very gradually formed out of previous signs. And no one of them can be understood except when considered in relation to those which went before. They all, in short, constitute a developing system and represent the mind also, as it is also considered as a developing system.

And, again, if we did not know beforehand how a particular experience would manifest itself in the system of signs, the signs simply as such would have no meaning whatever to us; they would not be signs of anything. Suppose I observe the movements of a complicated machine, going on in a series, — a machine which I do not understand. Its movements are not signs or expressions to me of anything. They really are signs, however, expressions of the plan of action of the machine, stages in the idea or state of consciousness of the designer, which the machine embodies. And as soon as I understand the machine, which means as soon as I have the same state of consciousness or idea that he had, then the movements in their series or system do become signs, real expressions to me. I must be, then, actually introduced into the same system as the idea and the machine, in order to find what the expressions mean.

Looking at the child's expressions again, we see that they are expressions to us only because we are in the same system — the human, the life system — with the child. I have gone through the same systematic evolution of signs that he is going through. So the question of the origin of expression again widens itself out magnificently. It stands for an answer thus: not only why do the child's expressions — mind and body together — develop on such a system, but also why do all of us who understand the signs — man, child, beast — find ourselves in the same system of signs intelligible and usable by us all. How can we account for a great organic mind system in the world, and with it how account for its organic embodiment in the system of signs which we call expression?

This, it is evident, makes expression a function of organic evolution, and really identifies the science of expression with the great branch of biological science called Morphology. For signs of functions are always shapes of organs, temporary or permanent, and a system of shapes is always a system of permanent signs.

We must accordingly appeal to the theory of development to explain all expressions whatever.

§ 2. *The Theory of 'Emotional Expression'*

Recent discussion has brought out certain great facts about the psycho-physics of emotion.

The outcome of discussion takes form about two or three general principles which I am now aiming to state in their general bearing upon the origin of 'expression' generally. It is evident that the word 'emotion' may be used in two very distinct senses. Emotion may mean a phenomenon of instinct purely, the 'emotions' which a baby a year old has already got, such as fear, anger, jealousy, sympathy, etc.;

or 'emotion' may designate a phenomenon of ideas — something that the baby has yet to get, such as the emotions, or sentiments, which involve thought about things, contemplation, the more or less adequate understanding of the *meanings* of things in relation to the person who is affected. A child, for example, starts at a loud noise, and shows all the signs of the emotion of fear; but the adult fears a loud noise only when he has some reason to think that it means danger to him.

If this distinction be true, — and no one denies the distinction in fact, apart from the terms which have often hopelessly obscured it, — it becomes evident that the question as to what the components of emotional 'expression' are, is really a genetic question. All the elements of the problem of the genesis of 'expressions' generally — that is, of the laws of motor development — must be recognized and woven into an adequate theory.

And when we come to do this, two very important facts come before us, of which it is our duty to give some account. We have first to ask why each so-called emotion has the particular channels of 'expression,' or motor discharges, which it has; and second, how it comes that the same system of discharges or expressions answer for the two kinds of emotion which we have distinguished as, in one case, a phenomenon of instinct and, in the other case, a phenomenon of ideas. How is it that what I fear because I have some reasonable ground for fearing it, the child also fears by instinct, and that I make the same contractions, etc., in my state of fear that he does in his?

The first of these questions may be called the 'psychophysical' question of emotion. It asks how the mental state which we psychologists call emotion is actually related, in any particular case, to the movements, contractions, vaso-motor changes, etc., which the body shows when it is 'expressing' this emotion. Does the mental state, the true emotion, come first, and itself cause the bodily expression, as we ordinarily seem to think? Or is the emotion itself the consciousness that these violent bodily changes are already taking place? This is the problem which men are now discussing, and it is this which I wish to take up in the light of the principles of development which have been already laid out in the earlier pages. And we can ask ourselves the question in somewhat the following form, namely: How could what we know as emotion, together with what we know as emotional expression, have arisen in the course of development, and what does development teach us of the relation of these two things to each other?

When, then, we come to take a broad survey of motor development, in the race no less than in the child, we are able to signalize certain great principles which we cannot do without: principles which stand out in biology and in psychology as essential to any theory of development. The whole range of facts fairly available for the genetic theory of emotion reactions should be brought under our three principles: *Habit*, used broadly to include the effects of inherited endowment, as illustrated by instinct, as well as acquired functions; *Accommodation*, the law of adaptation in all progressive evolution, no matter how adaptation is secured; and, earliest and most fundamental, *Dynamogenesis*, expressing the fact simply of regular connection between the sensory and motor sides of all living reactions, as to amount of process. These principles have already been given some notice. Let us see, therefore, how, if we assume that these three principles are all the 'rules of procedure' which the organism has to work under, — how, then, emotion and its expression can have come to be.

I. As for the fact of Dynamogenesis: what bearing has this principle upon the theory of emotion? Much every way. We must bear in mind that this principle has always been acting, and always is acting, in every reaction we make; that our reactions have grown to be what they are in all cases by direct reflection of what we have received or experienced; that just as certain as it is that we are experiencing new things every instant of our lives, just so certain is it that we are expressing these new experiences in every action that we make. Every one is familiar with Professor James's view that our minds never have just the same contents twice over. Of course they do not. But the correlative fact has not had the same recognition. If we never experience the same twice, so we never *act* the same twice. The new x of content, added to the old c of content, must call out a new x of action, added to the old a of action. If then our reaction is always $a + x$, just as the content which it follows upon is $c + x$, then no reaction is ever that and that only which is guaranteed by habit, inheritance, and what not, in the past.

For it is easy to see that in every action of every organism at every stage of development there are two elements of discharge: an element due to habit solely, the discharges which are let loose by the old quantity of content into the pathways fixed by association, and then, second, an element of new discharge due to the new quantity of content.

With this distinction in mind, we come to ask whether emotion is present in this state of things. Suppose we are taking a particular instance of fear when we know that it is present, and then ask what factor in this whole state of central process the emotion really corresponds to. We find several possible answers.

The emotion may be said, in the terms of one possible answer, to be due to the presence of the new elements of content; to the commotion made by new presentations, images, play of thoughts, etc.; and the expression to be due to the passing off of this commotion to the muscles. The reply to this view seems easy when we remember that with the instinctive emotions, our case of the child's fear, it is a very old familiar thing, not a new thing at all, which excites the emotion; yet granted this, we still may say that the discharge due to the new elements of content in other cases of emotion, not so clearly instinctive, must, on our view of excess discharge, give some feeling of either pleasure or pain, and it is possible that the pleasure or pain tone of all but the instinctive emotions arises in this way. It may be an element in consciousness brought about by new accommodation conditions.

Yet this again may be disputed. One may admit the new element of discharge due to dynamogenesis, but then add a pertinent view. We may distinguish content + its expression, from content + *feeling* of its expression; saying that there is no consciousness or feeling of the new element of motor process until it is itself reported as a new element of sensory content. Quite possible; it may be so, if the nervous system has developed that way. But we are convinced that it has not developed that way. We have found it necessary to hold that the pleasure represents the heightened organic process from which the excess discharge which issues in dynamogeny is itself released. Of course, as has been said above, the effect of the discharge in movement is reported back in a new element of pleasure or pain, but that is only claiming for it in turn an influence upon the vital processes whose condition is the sole direct ground of pleasure-pain consciousness.

So we may safely say as the result of the action of dynamogenesis that there is in all emotion — as in every state of consciousness in which there are new elements of content — a tingeing of pleasure or pain due to the presence of these new elements of content; and that there are in all actions, under the same conditions, new elements of discharge which give part of the movements involved in the so-called expression of that state of consciousness.

II. With this result well in mind, let us inquire more fully into the influence of the second of our principles, Habit.

It is now evident that a motor reaction of any kind has always two stimulating antecedents: one the influence fixed by habit, and the other the influence of the new elements of content presented by the environment. But we know that habit tends to make reactions automatic and reflex; and that consciousness tends to evaporate from such reactions. As I put it long ago, "psychologically, it [Habit] means loss of oversight, diffusion of attention, subsiding consciousness." [1] Hence we must admit that those actions most dominated by habit — the smoothest and most instinctive — have *least consciousness* in their carrying out. And, on the other hand, where habit is least influential, where the content is largely new, where the pleasure or pain of its assimilation is great, there attention and effort are strained, there excitement runs high. In all these cases the stimulating influence is new, one which has not yet been brought under the influence of habit, and so one which adds a new dynamogenic quality to the reaction.

It turns out, however, that just those 'expressive' reactions which are most instinctive and reflex (fear, anger, joy, etc.) really do carry with them most of the consciousness which we call emotion — certainly vivid and disturbed enough. What then shall we say? Either that there are really present other new elements of content additional to the

[1] *Feeling and Will*, p. 49.

regular antecedents of the reflex; or that the emotion is not the antecedent of the expression at all, but that the reverse is true — the emotion is consequent upon the expression. We cannot hold to the former alternative. Where are the adequate stimulants in conscious content, new or old, to the newly hatched chick's wild fear of the hawk?[1] So we must take the other alternative, and *hand over all this class of reactions to the theory* which holds that the emotion, so far as it has fixed instinctive forms of expression, follows upon the expression. I have no hesitation, therefore, in adopting the 'effect' theory of emotion recently announced by Lange and James as regards inherited emotional expression excited by constant definite objects of presentation.

Emotion is, on this view, therefore, no exception to our law of ontogenetic growth: the law that that which is habitual is carried out with least consciousness. The high consciousness in emotion is a reflex effect. But we would expect, on the other hand, that in all the ideal states of mind, in all the new complications of content to which the attention has to get adjusted, in all emotional states which do not attach immediately and unreflectively to conscious objects of presentation, — that in all these cases the exciting influence should have the dynamogenic effect already noted, and so give elements of expression over and above the reactions due to habit.

Reverting, now, to our fancied situation, a state of emotion in actual operation, we find that we have made certain simplifications. The pleasure or pain of it is, at least in part, due to the presence of new elements in the object which causes the emotion; the expression of it is due, at least in part, to the new discharges let loose by the central process corre-

[1] This illustration may still serve, although Professor Ll. Morgan finds no such congenital fear-reaction in the chick.

sponding to this pleasure or pain; the expression is further due, certainly in part, to old reactions or habits of movement which have become common in the presence of this object or others of its class; and the quality of the emotion, the character it has as making it different from other emotions, is due, certainly in part, to the feeling of these factors of the expression actually taking place. So far, then, we have accounted for *something* of the pleasure or pain of an emotion, *something* of its expression, and *something* of its peculiar quality or character. Can we do more? Let us see what we can get out of our third principle, 'Accommodation.'

III. The law of Accommodation has appeared to us to be operative in two ways: first, as expressing the mode of each new adaptation under the action of dynamogenesis, — the organism adapts itself by the selection, from excess discharges, of movements fittest to aid vitality, — this is one aspect of accommodation; and it also secures by the action of association, the repetition and permanent fixing of the fittest movements in great habits which are the regular utility reactions, reflexes, instincts, fixed expressions, etc., of the organism, — this is the other aspect of accommodation. Now, the bearing of the second of these aspects of accommodation on the theory of emotion gives us great expectations at once, for it enables us to bring into its complex conditions all of the organic and mental elements which are regularly associated with those factors already pointed out. Let us look a little at details.

We found that a new object served to bring new vitality conditions, new pleasure or pain, new movements by dynamogenesis. But these new elements only get fixed for recurrence as they fit into old adjustments, causing differentiations of them. This means that the new gets associated with the old; so that when it comes again, all the old which its presence touched on the former occasion now clusters to the front in company with it. I tremble and fly at the sight of a lion, because he *reminds me* of a lion's power and disposition; and my attitudes in the presence of such formidable creatures are those of trembling and flight. So, in brief, we have a great mass of associated elements, both of content and of movement, rushing into consciousness in consequence of every new adjustment, and in addition to its present intrinsic motor and emotional value. This gives more quality and more pleasure or pain to the state of emotion.

This principle applies directly, also, to all the organic, visceral, conæsthetic, sensations so vividly present and soul-filling in many emotions. All habitual reactions in states of emotion, as they become more reflex, and hence less conscious in their actual carrying out, yet come to give, nevertheless, by their return wave upon consciousness, overpowering floods of organic sensation. I think it is due to the fact that it is by muscular movements of excess with accommodation, by violent, often long-continued, protective or offensive reactions, that violent pleasure and pain conditions of vitality were originally reflected in action, in the history of animal life. This exhaustive muscular process taxed for its maintenance all the organic processes, — heart, lungs, etc., — so that a great mass of organic sensations were thrown into consciousness, and by unbroken association came to stand themselves, in union with muscular sensations, for the damaging or beneficial *kinds of stimulation* that at first excited pleasure or pain, even when the object actually present has no intrinsic emotional value. And so far as they were themselves vitalizing or devitalizing, they are directly hedonic, and so go on to increase their own good or bad effect. It is thus probable that in our more violent organic reactions in emotion, often pathological, the organism is exhibiting the wear and tear of the long processes of offence or defence that animal forms were accustomed to go through when they met the objects which now tend to excite these emotions and sensations in us.

This element explains most of the grosser part of the 'emotional expression.' This reflex flood explains most of the quality and much of the pleasure and pain of those emotions which have instinctive expression. So far, then, the body of emotion is largely filled up with consciousness of habitual actions actually shooting off, these habits being, in their origin and gradual formation in evolution, selections, all the way through, from excess reactions springing from varying vital conditions. Certain laws of their development have been formulated by Darwin and others; laws which answer the great question why a particular emotion is present when particular bodily attitudes, vaso-motor changes, visceral sensations, are also present. This I speak of further below.

And the other aspect of the principle of accommodation lets in more light on emotion. In this aspect of accommodation — named first in order above — we find the sphere of new adjustments secured by the constant modification and differentiation of old ones. There is a great field of such accommodation in the fact and function of attention, a thing of such clear mental value and such wide bearings that special sections are devoted below[1] to its rise and development. Here and now I can only assume what is there argued for, and note the relation of the attention, considered as mental *function of accommodation*, to emotion.

Consciousness, we have seen, is the new thing in nature — the thing by which organisms show in all cases their latest and finest adjustments. And the central fact of conscious-

[1] Below, Chap. X., § 3, and Chap. XV.

ness, its prime instrument, its selective agent, its seizing, grasping, relating, assimilating, apperceiving — in short, its accommodating element and process — is attention. This all current psychology admits. And the psychology which is aware of its genetic problems will also admit a further point; this — that in the life of the higher organisms, such as pre-eminently human life, the mind has superseded all other agencies and processes in aiding and securing adjustments to environment. If these two things be admitted, — the points, to repeat, that mind is nature's great accommodating agent, and that attention is mind's great accommodating agent, — then it follows that the law of accommodation must get its application almost exclusively, in higher organisms, in connection with acts of attention.

Now in the later chapter referred to, it is claimed, with some indications of proof, that attention is simply the form which the 'excess' process, found in our earlier discussions to be the means of all organic accommodation, has taken on in habitual connection with memory, imagination, and thought. The attention process is a motor reaction, involving all the elements of such reactions to a mental content, as these reactions have become, by habit, crystallized in certain fixed forms of vaso-motor change, muscular contraction, etc. Just what elements are involved in it — that comes up later. Here we assume this doctrine of attention, and go on to ask its relation to our present topic, emotion.

We see at the outset that if attention is the habitual form of mental accommodation, what we have said about the factors found in lower emotion — the factors all of which are genetic elements present together, heightened dynamogenesis, reflex feelings of discharge, associated organic disturbances flooding consciousness — must be true also of attention.

That is, every act of attention must give all these factors in kind, but on a higher level — a level at which the stimulus which claims attention is now a mental image, a memory, an *idea.*

We should have heightened dynamogenesis, looking at the matter in some detail, first felt as pleasure and pain in the activity of attention itself in receiving, holding, using new ideas. This is just what psychology does find and calls 'ideal' pleasure and pain; and it is the basis of the doctrine of Ward and the Herbartians that the play of ideas is the locus of all hedonic consciousness. Ideal pleasure, simply as such, abstracted — as of course in fact it cannot be — from all qualities in the content is, on the physical side, heightened nervous process in the organic seat of the higher content attended to. It is just the same, for ideas, that lower pleasure is for sensation contents.

Second, we ought to have certain qualitative elements brought into consciousness from the habitual contractions, etc., of attention itself; the attention is, in large part, certain constant reflex contractions — of brow, and glottis, movements of skin of skull, etc., together with the organic sensations from the vital processes associated with these. This is again so evidently the case, that we find certain qualities of feeling, called 'emotions of function,' connected with movements of the attention: the sense of contraction or expansion, of fatigue, of effort, of freshness, of curiosity, of interest, etc.

Then, third, a true analysis of attention shows that there are certain refinements of attention, whereby the elements which go to make it up vary very markedly according to the character of the idea or object attended to. There is visual attention to visual ideas, and auditory attention to auditory ideas, motor attention to ideas of movement, etc., each made up of its own refined system of contractions and organic effects, inside of the wider circle of contractions and effects which make them all acts of attention in the generic sense. Now, in so far as these smaller refinements of effect get themselves grouped into relatively independent habits, just so far they contribute new quality to the whole psychosis which the given object or idea, claiming the attention at the moment, wraps about itself. And these constitute the higher qualities, emotional states which we call sentiments, higher feelings, theæsthetic, the ethical, the religious, etc.[1]

The theory of development, in short, requires that we distinguish the hedonic from the qualitative element in higher emotion. Intellect could not have developed in the first place, nor have become the magnificent engine of organic accommodation, through volition, which it is, if intellectual, æsthetic, and ethical *pleasures* were only the resonance of instinct reflexes. Yet even here the *qualitative* marks, the kind of excitement, the main psychosis apart from the pleasures and pains of new apprehensions, knowledges, curiosities, are just as surely, and for the same genetic reasons, the resonance of instinct reflexes as are the gross fixed expressions of anger, fear, etc., in animals.

So, taking stock of our net outcome, we find that our principles of development have, assuming the development itself, told us to expect groups of elements in consciousness at certain stages of evolution. And when we come to examine and analyze consciousness at these stages, we find that these elements so grouped are just what we ordinarily lump together and call emotion. And the predominance of one or other element in a marked degree in a particular case is entirely

[1] The reader may consult the classification and treatment of the emotions given in my *Handbook of Psychology*, Vol. II., Chaps. VIII. ff.

the ground of difference between this case and others, and is entirely a phenomenon of relative development. The infant, and the animal which has not that highest engine of accommodation, — attention, — have the reflex, habit-born, organic thing called, it is true, emotion; but its quality is 'rank,' unreasonable, urgent, a matter of nerves and instinct. And that is all the infant has, except the pleasures and pains which are also sensations, or *quales* of sensation.

But the man — the child plus mind — has the higher agent of accommodation, attention, and that supreme form of attention called volition; his emotion has added elements, not different in kind, but only in level, and in relative freedom from the grosser implications of organic habit. He has refined emotions about his thoughts, his ideas, his ideals, his duties, his gods.

My conclusion, then, is that emotion is, in all cases, this: pleasure and pain of accommodation, plus pleasure and pain of habit, plus a certain lot of qualities contributed to consciousness by more or less habitual processes of muscle, organ, and gland, going on at the time.

And the expression of emotion is, in all cases, this: certain more or less habitual processes going on in the organism, plus elements of muscular and bodily contraction due to present pleasure and pain. That is all.[1]

[1] A partial development of this general view, with special reference to current theories of emotion, is to be found in my article, 'The Origin of Emotional Expression,' in *The Psychological Review*, I., November, 1894, p. 610. I am glad to say that my conclusions are very near to those reached, by analysis, by William James in his latest formulation (see the same *Review*, I., September, 1894, p. 516); conclusions which, I think, are not just the same as those of the chapter on 'Emotion,' in his *Principles of Psychology*. Certain cases of the rise and progress of emotion in the child — its ontogenesis — are treated in detail, in addition to what is said in Chap. XI., § 3, below, in the volume of *Social and Ethical Interpretations*.

§ 3. *Hedonic Expression and its Law*

In the preceding section of this chapter we found two questions implicated in this matter of expression: one of them we have now attempted to answer, that which concerns itself with the psycho-physics of emotion as a phenomenon of consciousness taken generally. We now come to the second question. It brings up for our consideration the fact of particular expressions as attaching to particular emotional states, and asks how it is that each such particular instance of organic and muscular expression could have arisen and come to be what it is.

It has become evident that the general principles of development apply to all expressions, and that in explaining any particular case we have only to ask what aspect of development is predominantly concerned. At the same time it must be equally true that all such aspects, however we may find it necessary to consider them as separate principles to explain different classes of phenomena, must nevertheless have their common basis in the one original fact of contractility, with the modifications and adjustments which it undergoes in evolution.

Now it has become plain that all motor-discharge, so far as it is differentiated at all, gets to be so as an index of waxing and waning life processes of nutrition, etc. And we have seen that the waxing and the waning must have been equally original wherever life was present at all. This waxing and waning life process must reflect itself in the movements of the organism, giving two great types of movement in all life, however low in the biological scale. And we have found it possible, in the examination of higher forms of life in which consciousness with pleasure and pain are clearly present, to classify the organic manifestations correlative to pleasure and pain under a similar twofold effect on organic and muscular movement. So it has been simply the logic of fact which has led us to say that this twofold type of movement, showing relative vitality in lower organisms and relative pleasure in the higher, is one and the same phenomenon; and that even in the lowest forms of life, waxing and waning vital processes are to be considered as the physiological analogue of the pleasure-pain consciousness.

In this fundamental division of movements, therefore, expansions, heightened motor energy, and excess discharge, on the one hand, and contractions, lowered energy, inhibited discharge, on the other hand, we have what I venture to call 'hedonic expression,' with the law of its twofold manifestation. Inside of this all further differentiations of movement must arise as special adaptations. It remains to examine them further with a view to the understanding of their rise; and in connection with them further light may be expected upon this general condition of them.

§ 4. *Habitual Motor Attitudes*

I. The teleology of all special adaptations of movement — the reason for their existence, the end which they would have in view provided they could think and speak — now becomes plainer than it was before. This end is not in any sense *expression.* The organism has no special tendency to show itself off, no means of acquiring systems of 'signs' to show what is in consciousness beforehand. The only such signs are these very typical differences of movement which correspond to waxing and waning vitality — to pleasure and pain. These are expressive because, and only because, they are different, and so reflect differences in the processes which issue in them. The subsequent modifications of movement of any and of every kind, have quite a different origin. They have in view the adaptation of the organism in further detail to the conditions under which the life process exists. Their end, each of them, is to keep up the stimulations which secure the waxing, and to avoid those which bring about the waning of life. How can they be expressions of what is not yet secured or avoided? Of course, all movements which do secure one of these ends, and so become fixed as habits in the organism, may and do then become signs of the effects on the organism which it is their office to secure, and we may then reverse the order of rise of the two factors and consider, for convenience, the life-process cause and the movements which are really means to it, effect. This is what the phrase 'emotional expression' does. But the 'expressions' of emotion, as we have already seen, are — apart from the dynamogenic issue of pleasure and pain — not caused by the emotion at all. The emotion is the outcome of them.

As far, therefore, as there is any true expression, as far as there are any movements which are really in their origin the characteristic outcome of what is beforehand in the mind, it is all summed up in the one antithesis with which life begins: that between organic and vital expansion as expressing pleasure, and organic and vital depression as expressing pain.

This may be put in the general statement already made, that all expression, properly so-called, is *hedonic expression*, which is the reflection, in the organic and muscular functions, of the relative influence of experience of any kind upon the vitality of the organism. It comes vividly before us in detail in the later chapter on 'Organic Imitation,' a phrase which simply serves to indicate the general method by which, through this one form of expression, the organism works its new adaptations.

The particular organic and muscular states which are associated with the emotions, such as fear, anger, etc., and called popularly their expression, must have arisen not, as we now see, as expressions of anything, but as co-ordinations and associations of reactions which proved useful to the organism in maintaining and improving its vitality. All of them, then, were originally utility reactions, and arose each in its place, and the system of them as a whole, as special adaptations. They fall under the theory of adaptation and exhibit particular instances of it.

So the question of the rise of these groups of movement takes a new form, and its answer comes to require that each such so-called expression shall be shown in its origin to have been useful to the organism in certain conditions of its environment.

This detailed inquiry evidently belongs to the general theory of organic evolution. Darwin has himself examined the various instinctive 'expressions' in detail,[1] and proved, beyond a question, that most of them were originally useful ways of reacting in the storm and stress of maintaining, defending, and extending life. Further aid in this tracing of the evolution of expression has been afforded by those investigators who have analyzed the anatomical and physiological conditions of many such groups of effects.[2]

The results of their work have not been entirely successful, however, as concerns details; since there has always remained over a residue of well-marked effects, accompanying equally well-marked emotional states, which could not be shown to have been useful to man or animal. Darwin himself for-

[1] *Expression of the Emotions.*

[2] Bell, *The Anatomy of Expression;* Mantegazza, Mosso, etc.

mulated the principle which states the one real organic requirement, namely, the utility of a group of movements in the life history of the organism. But he did not stop here. He found it necessary to place beside this principle certain others, which served to explain the cases to which the utility formula could not be made to apply.

Darwin's principle of 'serviceable associated habits,' however, is all that the case really demands when we come to get an adequate view of the process of development. It is now my aim to show that the theory of development stated in earlier pages of this book enables us to restate the results of Darwin's work, so as to include all cases under the one great principle of 'serviceable associated habit,' taken together with that of 'hedonic expression' already explained.

II. The series of facts which gave Darwin greatest trouble are those which he gathered together under his 'law of antithesis': cases of animal attitudes in certain emotional situations, which seemed to be capable of serving no useful purpose of any kind to the animal, but which were very clearly just the reverse of other attitudes, which went with the opposite emotions and were evidently useful in connection with those emotions. For example, — to cite one of the cases so powerfully illustrated in the photographic copies reproduced in Darwin's book, — a dog in anger strikes certain attitudes of *defence*, such as general rigidity of muscle, high back, bristling of hair, retracted lip, forward ears, etc., — all of direct use in a fight with his enemy. But the dog's attitudes when he feels friendly and welcomes his master are just the reverse — general limbering of muscles, flexible turnings of body, lowering of back, fawning, backing of ears, close-lying hair, etc. The emotion is antithetic, so the expression is also; that is the only reason, practically, which Darwin could give for the animal's attitude in the second case.

There are a great many such instances in the series of emotional attitudes in animals and man. But we have only to state the principle of antithesis clearly, to see that it is no principle at all, unless we hold that the emotion causes the expression. And even then, we are no better off, I think. For we still have to ask why the emotions themselves are different. This, we have seen, we can only answer by saying that they are different because the movements have been different by which the organism got itself adjusted to the particular objects, etc., giving these several emotions. We come, that is, back to movements again, and have to explain why, in these cases, the movements are antithetical.

Darwin himself is as modest here as elsewhere, and only says that it is natural that opposite mental states should be associated with opposite physical states. But there is no reason, so far, that they should in fact. Darwin here makes, quite unconsciously, an incursion into the field of popular fallacy and of Hegelian logic. It is a perfect nightmare, — which should be left to the Hegelians to revel in, — this reading into nature of opposites to all her facts, simply because the mind's forms of thinking go by contraries. Why, if showing the fangs aids an animal when he fights, should covering them aid him when he loves? His teeth are involved in one case, but not in the other. If rigid length aids him in standing up against his enemy in a fight, why should contortions be indulged in when he sees a friend?

The only general fact which in advance seems to make these antitheses likely, is the arrangement of the muscles, whereby they go in pairs, called 'antagonists.' Each muscle of such a pair is held in control by the other; and whichever contracts, the other is involved in some kind of an opposite contraction; so it is easy to say that when consciousness is in a state which represents the stimulation of one muscle, it is only to be expected that the passage of consciousness into an opposite state will not only release the one muscle, but, by a kind of organic rebound, stimulate the antagonist. This is physiological and true; but it still in no way explains the *origin* of different contrary attitudes; for it is a main task of the theory of development to explain just this arrangement of the muscles. How does it come that there are antagonistic muscles? What uses called them into being? For the muscular system has developed by use and fitness. Once answer this by showing the practical use of both muscles of each pair of antagonists, and we can then explain both the fact that attitudes are antithetic, and the further fact that opposite emotions are there with them. For we have seen that it is the muscular and organic attitudes and associations which give quality to the emotions.

It becomes necessary, therefore, to completely reverse the popular conception of antithetical expression and Darwin's conception also, as far as he leaves the facts which he so adequately describes, and shares in the theory that an emotion causes its so-called expression. We must find in our theory of development by means of detailed motor adaptations, ground for the origin of a muscular system which works by antithesis of push and pull, forward and backward, contraction and relaxation, antagonism, in short; and with it the detailed differences among these attitudes themselves, which correspond to differences in emotions, as we actually find them in our experience.

The latter task is largely a matter of detailed examination and classification of the various muscular groups found in the different emotions. This has been done with some success for many emotions. I shall not attempt to take this farther here. The genetic problem, however, the rise of antagonism, is a further question to set before us.

It has doubtless occurred to readers of the two preceding chapters, what account is possible of the rise of muscular and emotional antagonism. The facts of organic gain and loss, contraction and expansion, pleasure and pain, have already cost us so many words that it tends to come to mind at once as an explanation of the fact of antithetic expression. What has been said of hedonic expression, recognizing it as the only expression as such, leads us to expect a great division among states of consciousness with respect to their hedonic colouring as pleasurable or painful. If organic life has from the start manifested itself in two forms of movement, and if all new adjustments have been effected inside of this fundamental bifurcation, then of course the muscular system, in its development, must take on the form of a series of organs fitted to carry this original antithesis into all the details of life. This is exactly the account which must be given of the rise of the muscular system, with its pairs of antagonists. The muscles represent special habits and combinations of movements fitted either to close up upon and hold stimulations, or to draw away from and escape them; and these are antithetic ways of behaviour.

It is evident, however, that this explanation of antithetic functions was not possible on the old theory of the nature of emotion, the theory that the emotions are so many distinct mental acts or functions which 'express' themselves outwards in the muscles. For expressions of such a kind might just as well as not come into opposition with hedonic expression, or they might clash with the reactions most useful for the organism in relation to its environment, or, again, they might, by their cross currents, prevent the development of a muscular system on any consistent plan. The old view gave rise to all kinds of dualisms; the dualism between pleasure-pain and emotion being most of all invited.[1]

It is the force of such a criticism, implicitly felt rather than clearly recognized, that has led so many psychologists to claim that emotion is only a compounded state of pleasures or pains, a position which well deserves the description given it by James:[2] "This is a hackneyed psychological doctrine, but on any theory of the seat of emotion it seems to me one of the most artificial and scholastic of the untruths that disfigure our science. One might as well say that the essence of prismatic colour is pleasure and pain."

This view of antithetical reactions is also impossible on the current biological theories of development; that is, either on the theory that accounts for all development by compounded repetitions of reactions, alone, or on the more psychological theory going by the names of Spencer and Bain. For this view requires us to recognize an original tendency of organic forms to react in two antithetical ways with reference to stimulations which give the two original vital effects corresponding to pleasure and pain; and that none of the earlier theories do give this recognition, is shown in an earlier place. Darwin held — as far as he took up the theory of ontogenetic adaptation, as I think he nowhere did explicitly — the ordinary biological doctrine of adaptation by chance repetition and compounding of movements which proved themselves useful; so of course he was unable to see any real reason for the existence of systems of move-

[1] See my criticism of such a dualism in the work of Marshall (*Pleasure, Pain, and Æsthetics*), in *The Psychological Review*, I., November, 1894, pp. 619 f.

[2] *The Psychological Review*, I., September, 1894, p. 525.

ments to which no special utility in race history could be assigned.[1]

Our conclusion, then, in regard to antithetical attitudes,

[1] It may be said, as it has been said to the writer, in conversation, by one who is well informed in biology, that this view which requires the distinct recognition of movements toward advantageous sources of stimulation and away from what is disadvantageous, is taken by many biologists, and so there is no need of argument. With this I do not agree; and it is well to point out the fact that Darwin in this crucial case of antithetical movements did not use any such principle. And yet the need of some such real antithesis so strongly impressed the mind of Darwin, as is seen in his detailed casting about in his Chapter II. for some proof of antithesis, that his attitude seems to me to throw his authority somewhat on that side in opposition to the current theories which consider the organism practically passive in its uniform responses to stimulation. Passages, indeed, might be quoted abundantly from Darwin, which show what his doctrine of organic adaptation probably would have been if he had developed it. Of course biologists admit the fact that living creatures of certain kinds behave as if they found some sensations pleasant and others repulsive; it is the facts as reported by biologists that I am resting the case upon. But they have never, I think, made this kind of antithetical reaction fundamental to the life process, nor have they ever utilized it to explain general motor adaptations. It has been treated instead as a sort of outside fact and, as it were, a mystery, a fact which the chemical theorists did not like to recognize at all, and one which the vitalists cited in support of 'vital force,' 'directive tendency,' and that kind of thing. Recently psychologists have taken it up as lending evidence to certain theories of the 'psychic properties of matter,' etc.

In short, this most remarkable of all adaptations in biology has had just about the same treatment in that science that the fact of conscious imitation has had by psychologists. Conscious imitation has been remarked upon ever since Aristotle, vaguely described, and then dropped, simply because psychological theory gave no opening for such a mysterious thing. I cite below the contradictory utterances of certain psychologists on imitation.

And when we come to compare the two facts, it is sufficiently plain that the theory of adaptation may be reconstructed in such a way as to show that this kind of functional selection by movement, and this kind of imitative selection by consciousness, are in type the same. 'Organic imitation' and 'conscious imitation' — each a circular process tending to maintain certain stimulations and to avoid others — here is one thing. Organic and mental adaptation is one process and one only, and it works by this contrast of movements from the start.

is that antithesis is a fundamental fact of hedonic expression; and as hedonic expression is the only real expression, the principle of antithesis becomes, everywhere in motor development, the one law of expression. The other principle, already mentioned, of Darwin's, that of 'serviceable associated habits,' is, on the other hand, the one principle also in its sphere; but its sphere is not expression, — its sphere is motor adaptation. All adaptations whatever — except the first great division of movements in accordance with the law of antithesis — are 'serviceable associated habits,' or 'utility reactions.'

Consequently we may say that in any organic attitude whatever, the case is the same as we found it to be, in the earlier section, in emotional attitudes. There is the real expression factor, the new hedonic element, issuing in new antithetical phases, by the law of dynamogenesis; and there is, besides, the quality as such, the differencing 'feel' of the attitude accomplished, with its habitual pleasure or pain, and all the organic associations, which are in all cases due to the reflex, consolidated, instinctive, sometimes pathological, habits of action originally useful.

Mr. Darwin also finds it necessary to recognize another class of facts which he is unable to bring under either of the foregoing principles, facts which he puts together under the so-called principle of 'direct nervous discharge.' He finds over and above the movements which show reactions useful to the creature or to his ancestors, and also over and above the movements antithetical to the foregoing, certain movements of the animal which appear as such to follow no law.[1] This very fact of lawlessness, overflow, accidental issuing of the stimulating process right out into the muscular and organic systems, is expressed by the phrase 'direct nervous

[1] See his detailed instances, *loc. cit.*, pp. 66 ff.

discharge'; all it means, therefore, as a principle, is that we are dealing with phenomena of stimulation and reaction. Such cases are one's convulsive movements when in a dentist's chair, the jumping and clapping of hands of a child's glee, the lawless gambolling of playful lambs, and the skittishness of a horse on a cold day, — movements which are not just alike in any two creatures, nor just alike in any two experiences of the same creature, — and with it all, various general effects, such as trembling, shivering, fainting in fright, flushing in joy, blushing in shame, glandular secretions, variations in heart action, etc., some of them positively harmful to the organism.

This class of phenomena — facts which Darwin found no use for in the economy of organic development — are, from the point of view of our theory, most instructive and valuable as evidence. They give, to my mind, very direct proof of the main thesis respecting the method of organic adaptation. This we may see on closer examination, although the points are in the main so evident that the exposition may seem tiresome.

We have found that increased vital energies tend to produce heightened or excessive motor processes, — Spencer's 'heightened discharge,' Bain's 'accompaniment of pleasure.' We have found that this and its opposite, lowered vitality, express themselves in antithetical movements, expansions and contractions, advancing and retreating, etc. Again, we have found that it is from these antithetical movements that all further adjustments or adaptations are effected by 'functional selection,' those movements of either kind which are useful being retained as permanent utility reactions. And this scheme of course assumes the constant presence, at every stage of animal development, of the excess discharge — the 'hedonic expression' of an earlier section.

Further, the characteristics of movements which represent unutilized vital and nervous overflow are plain enough. They should be very diffuse, indefinite, purposeless, highly toned by pleasure or pain; diffuse, because they arise from central processes of such intensity as to overflow the ordinary motor channels already fixed by heredity and habit; indefinite, because so soon as they do get for themselves fixed ways of discharge, representing in any sense an accommodation of the organism to the stimulations which call them out, then at once they fall into another category, that of 'serviceable associated habit'; purposeless, because they represent excess energy over and above the regular expenditures called for by habitual purposive reactions; and highly toned, because their rise is itself a phenomenon of those vital conditions which lie at the basis of the hedonic consciousness.

Now these are just the characters which Darwin and other writers attach to the movements which illustrate his principle of 'direct nervous discharge.'

It is only, therefore, a step to the conclusion that in these movements we have, running through all life phenomena, high and low, the evidence of the excess processes, and their reverse, required by the theory of development. These are just the material from which new adjustments are made.[1] Certain of these 'direct discharges' happen to do something for the organism which it never succeeded in doing before; this secures pleasure or removes pain, and by the law of increased discharge through the same or associated channels, these movements pass over to the reign of the law of 'serviceable associated habits'; but with it all, the issue in movement of the increased vital and pleasure processes due to success, has again recruited or depleted the excess discharge. So the 'circular process' goes on.

[1] Except when extreme, when they may become useless and destructive.

We should find, however, that movements of this class are not quite lawless, nor purposeless. If I am right in finding that they are reactions in states of waxing and waning vitality, — that they constitute just the hedonic expression, the only expression, properly speaking, which an organism has, — then they should of course express something. They should partake directly in the characters found to mark off all antithetic movements. Movements which accompany highly pleasure-toned psychoses should be expansive, forward, outward, exciting; but besides, they should carry with them all the characteristic utility reactions which are already associated with pleasurable experiences. Movements, on the other hand, which accompany highly pain-toned psychoses, should be contractile, inward, repressing, and should carry along with them, besides, all the attitudes regularly associated with painful experiences.

Now I submit that the close observation of these confused — convulsive, if you will — sets of movement, do show this antithesis to a very marked degree. When they accompany pleasures they are found to involve not only those quite purposeless movements which simply mean diffused overflow of energy, but they show, moreover, two very clear kinds of utility reaction also. First, in excessive joy, we find not only the tremblings, weepings, heart-beatings, and muscle-twitchings, but also the usual habitual signs of joy which all pleasurable experiences show — the laugh, the facial expression, the voice tones, the bodily attitudes; and, further, certain tensions and movements of very evident utility, in grasping, retaining, coming-up-to-for-further-possession, etc., found in attitudes of welcome generally. And on the other hand, in connection with the random movements shown in violent painful emotion, we find as well two classes of habitual attitudes: first, those of organic and vital depression, felt as faintness, paralysis, sweating, etc.; and second, attitudes and acts of rebellion, defence, escape-by-removal from stimulation, such as frowning, setting teeth. And the two systems of attitudes characteristic of pleasure are, in general, antithetic to those characteristic of pain.

In fact, so clear is it that these 'direct' movements are limiting processes to the ordinary antithetic attitudes, that we are able to look upon them as end-terms each in a series which recapitulates organic growth with all its purturbations. Pleasure begins by bringing out the reactions which are oldest in race utility, then as it is continued or increased, those of newer formation and less universality, then those peculiar to the individual, and finally, at the limit of duration or excess of intensity, the purposeless convulsive and random movements of Darwin. And pain proceeds by a similar series of manifestations — tracing reversely the series of adjustments acquired in race and individual history, the whole series being antithetic, in its great features, to the corresponding series of pleasure attitudes.[1]

There is also another principle clearly, although inadequately, recognized by Darwin, which may now be brought out; the principle made more of in James's discussion under the phrase 'principle of analogous feeling stimuli.' Darwin added a clause to his statement of the law of 'serviceable associated habit,' which brings under it a great class of seemingly useless muscular movements. He says: "We have now, I think, sufficiently shown the truth of our first principle, namely, that when any sensation, desire, dislike, etc., has led during a long series of generations to some voluntary movement, then a tendency to the performance of a similar movement will almost certainly be excited, whenever the same or *any analo-*

[1] At the extremes, in both cases, there are convulsive discharges that are more mechanical than physiological.

gous or associated sensation, etc., although very weak, is experienced, notwithstanding that the movement in this case may not be of the least use" (italics mine). And he continues a little further on: "When we treat of the special expressions of man, the latter part of our first principle will be seen to hold good, namely, that when movements, associated through habit with certain states of mind, are partially repressed by the will, the strictly involuntary muscles, as well as those which are least under separate control of the will, are liable still to act; and their action is often highly expressive. Conversely, when the will is temporarily or permanently weakened, the voluntary muscles fail before the involuntary."[1] The latter quotation may be taken to be the citation from the voluntary life of an instance of the principle that similar or 'analogous feeling' stimuli tend to bring, in whole or part, by complication, semi-inhibition, or lack of inhibition, the reactions in movement which are habitual and useful in connection with the stimuli which they resemble.

This series of facts, which are, in the sequel, of the first importance for mental development, are of especial interest here, as showing the relation of the theory of development now explained to the older purely biological theory. The latter, it will be remembered, finds the exclusive cause of development in repetitions of reactions, under complicated conditions which force a crossing or compounding of paths, in such a way that each single movement, in response to each single stimulus, tends to lose its identity, and to become part of a larger discharge, which issues in a group of movements coordinated for a larger use and function. The conception of how this compounding takes place in the organism is a purely mechanical conception; a process of the draining of energies, first in the channels which are largest, most permeable, and

[1] *Loc. cit.*, p. 48.

most practised, and then into those less and less so; the whole group being called out on later occasions, as a group, so far as any stimulus, which the organism gets, starts the central energies into channels adequate to effect the discharge as a whole.

Now this conception of growing complexity, or co-ordination in reactions, is quite in order still, on our theory of adaptation, and it is indeed even more reasonable than before. Just in so far as the organism has a means of its own of selecting, duplicating, or maintaining, its stimulations, by adapted movements, as the 'circular' process enables it to do, just in so far is a premium put upon the speedy fixing of great drainage channels representing these particular adapted movements. And, further, just so far is there created the tendency of other, accidental and more trivial, useful or useless, processes, to drain off into these great channels. It is only an instance of this that the child learns with such remarkable speed to make great happy adjustments, each then leading to a number of smaller adjustments. The early start which all organisms have in the antithesis between the two classes of movements which express waxing and waning vitality, and hedonic contrasts, all in one — this secures a splendid organic tendency directly in the lines of discharge which smaller special adjustments need to issue in, and which, but for this preparation beforehand, the smaller ones would have to make by actual compoundings among themselves.

In interpreting this process more closely, in the life history of organisms, two aspects of it rise to claim special remark — aspects which break into psychology as analogies, or explanations, of far-reaching application, as will appear later on.

In the first place, there is at every stage of development in the animal series, a certain mass of normal process, 'set for good,' so to speak, which the creature brings to his experiences at birth. It may be thought of, functionally, as a tendency, of the organism as a whole, called its 'hereditary impulse,' to take a given course of development, which will in a measure recapitulate the course of organic development antecedent to this particular stage; and also as a tendency of the individual creature to acquire actions of particular kinds with great facility, by reason of these native organic pathways of discharge. The most marked instances of this latter are the instincts; but the tendency is equally present to the performance of functions not so completely handed over to nervous habit, but still requiring consciousness and somewhat gradual learning; such as speech, standing, walking, thumb-grasping, etc.

Now with reference to the influence of these innate tendencies, it is easy to see that everything which the organism does *will tend to conform itself if possible to them.* New processes of stimulation will set their discharges toward these old channels. Old ways of action will try to serve as adequate responses to new sets of conditions. To deny this is to say that the organism can simply create new habits for itself at the call of any stimulus from without. If the organism is one, then any new process must fight for its life, especially for its life of action. For a genetic view requires us to hold that there is no part of an organism, no muscles, no pathways, but those which have arisen for a use; so if a new thing is to be learned, it must resist the old ways of action and supersede the old ways of use, by overcoming the impulse which already urges the organism on, or it must itself accept and subsidize the old channels and muscles, and conform, as far as may be, to their previous habits of action.

This latter is the dominating result. All new experiences tend to lapse into old ones, to be in their effects on the organism identical with them, to have their differences rubbed off, and so to discharge through pathways used by the old ones.

This is a necessary result of an adequate view of the rise of neurological habits; and we will see below that psychology directly and imperatively confirms it. The principle of Assimilation, treated in a later connection,[1] is a direct reflection in consciousness of this aspect of the law of habit. And this is only to say, as Darwin said, that we ought to find, in certain states of mind, attitudes struck which have arisen, not for use in this condition of mind, but in conditions of mind which *feel like it* in any respect. But the two processes do not discharge the same way because they feel alike; on the contrary, their feeling alike is the sense that their discharge is the same way. The attitudes are useful in connection with the earlier stimulations, and for their sakes they arose; but they are also used by these other central processes, which thus come to be 'analogous feeling stimuli' for consciousness. So a great mass of apparently useless processes fall after all under the law of 'serviceable habits.'

But we have not yet got all the light we may — and it turns out to be psychological light in the sequel — from the consideration of these processes of compounding in the nervous organism. There is another great way of looking at the facts. The use of a given system of pathways and muscles for the discharge of certain processes which are different from those for which the pathways and muscles originally arose, — this amounts, it is evident, to a great series of possible *substitutions of processes one for another* in the chain of events which a given issue of movement represents. Suppose, in accordance with the principle of 'analogous feeling stimuli,' I make a wry face at my physician, because the sight of him makes me feel in a measure as I did when I took his bitter

[1] Below, Chap. X., § 3.

medicines. Here is the substitution of a visual stimulus for one of taste; to an outsider, it would be inexplicable that I should so 'express' myself in reference to this man. As a fact, emotional attitudes actually found in man and animals show cases of connection between the stimulus and its discharge just as remote as this, and equally unintelligible, until we come to see that by the usurpation of old habits of movement, a new experience gets permanently substituted for an old one, in the economy of the organism's growth, and so the conditions of the original rise and form of utility of the attitude in question are hopelessly obscured.

The evident outcome of these facts of substitution is, therefore, an exaggerated difficulty in telling how a particular attitude or series of organic changes, found associated with an emotion, actually arose; for not only may one substitution have been made in the course of race history, but many may have been made. This is shown in the rise of the 'short-cuts' described in the earlier discussion of the theory of Recapitulation.[1] The development of one process or function may be so necessary, and its substitution for another, and its usurpation of the discharge processes of that other, so complete, that the other may quite disappear, or be so overlaid with newer superseding functions as to be a mere rudiment, an apparently useless appendage to the organism's life. But the fact that we can thus account for such cases, on the theory of serviceable habits, is itself a sufficient reason for doing so. For it thus brings the whole life of organic reaction under the one principle of development.

This has also a very interesting application to the facts of consciousness. I try to show in a later chapter that it is this principle of organic substitution that lies at the basis of memory, and gives us an adequate genetic theory of the function

[1] Above, Chap. I., §§ 3, 4.

of representation as a whole. And further, and still more surprising, it enables us to see that it is by the 'circular' or imitative form of reaction, that the higher motor functions have had their rise. For in cases where man, animal, or animalcule, acts in a way which does not seem to be imitative, — does not seem to have as its objective point the maintenance or reproduction of a particular kind of stimulation, or 'copy,' — in all these cases, the principle of substitution comes in to remove the difficulty. We find that in these cases the original discharge processes of a reaction which was distinctly imitative, which did arise as a special adaptation to a particular sort of stimulation, have been usurped by a substitute stimulus, image, sensation, etc., and so completely, that the original stimulation, image, sensation, etc., which really effected and accounted for these processes in accordance with the law of utility, has been utterly blotted out. The case is argued later in some detail under the caption 'principle of lapsed links,' [1] so it need only be said here that this idea of 'analogous feeling stimuli,' tacked on by Darwin, merely, to the end of the formula for associated habit, becomes, in the higher reaches of psychological development, an explaining agent of wide application.

One further point should be noted. We are asked how it is that there are certain kinds of activities which are not only expressive of mental states, but are actually seized upon and developed by man for just the purpose, and no other, of expressing himself to others, — speech, gesture, song, music, fine art, etc. These certainly seem to make simple expression an end in itself, and their importance is so great that society could not exist without these means of intercommunication between man and man. What, it may be asked, was the original utility of such actions

[1] Below, Chap. IX., § 3, and Chap. X., § 2.

apart from the *conveying of a meaning* from one being to another?

It is easy to see, however, that true as this is, — and its importance is fundamental to social psychology,[1] — it makes no exception to the law of utility. For, of course, the conjoint action, the gregarious life, the conveying of meanings from one individual to another, is an acquirement itself profoundly useful to the individual and to the race. So to say that certain movements originally accidental, or diffuse, or hedonic — these last mainly, it seems — did convey meanings to other onlookers, is only to say that these movements themselves are adjustments for utility, as truly as are the movements, for example, which secure food. And that these expressive actions are selected, and these expressing beings, is only a result of serviceable associated habit. The evolution of hand-writing, as an engine of expression, from the rude drawing of objects, shows that the first tracings were fitted to perform just this use, and did so. They therefore survived, and were refined upon for this very utility.

In short, expression is itself an utility. 'Expression for expression's sake,' the formula which we so often hear, is misleading. What is really meant by it is conscious expression, known to be expression, and ratified for the sake of social and personal ends.

A further factor in the ontogenetic acquirement of emotional attitudes and expressive functions is at once so important and so obscure that I only mention it here; it has detailed treatment later on. I refer to the fact mentioned also by Darwin, and discussed by Romanes, Mantegazza, and others, that the young of animals, and especially young children, get most of these functions by direct conscious imitation of their elders. The child first really learns what cer-

[1] See the volume, *Social and Ethical Interpretations*, Chap. IV.

tain emotions are, by imitating the indications of them which it sees in the faces of older persons. We will see later that this tendency to imitate is really the higher conscious form of the very way of getting all useful actions which we have seen in lower organisms, the 'circular process' way; and so instead of presenting a new class of facts, it only serves to carry the principle of 'circular reaction' into the higher reaches of conscious function. In conscious imitation we have an impulse in which the very method of accommodation has been embodied, has become a habit. After knowledge arises, and voluntary selection, the first thing necessary to the individual in order to direct his life is to *find out about* all possible experiences; so the child imitates everything, thus securing in its own feeling, by this its own act of laying hold on experiences, the way of judging of things — and the material of its judgments — as to their relative value for further cultivation, and their relative difficulty in pursuit.[1] That great theatre of experience, that splendid natural kindergarten, the spontaneous games of children and animals, plays of all kinds, is a practice ground in imitative semblances of what is afterwards life's serious business; and the young learn how such things feel by these imitations of them, and so get prepared for their actual onset in later life.[2]

Looking back now upon all the facts which the various 'principles,' so called, are used to explain, we find a very mixed condition of things covered by the usual phrase 'expression of the emotions.' There are utility elements whose

[1] This is developed below in Chap. XI., § 3 (which, however, cannot well be read without the earlier sections on Imitation); its social and educational 'Interpretation' is to be found in the volume referred to.

[2] This 'practice' rôle, here assigned to play (in the first edition of this book), is that now made the essential feature of Groos' important theory (see his *Play of Animals* and *Play of Man*).

rise by selection is plain; utterly refractory convulsive elements, whose lawlessness to all but mere discharge is evident; partially useful elements which had their origin in uses which they no longer serve; elements whose usefulness is clearly 'outlived and which are falling rapidly into decay, — being rudimentary,' as the biologists are wont to say, — and various groups of confusions evidently due to the grinding, erosion, rivalry, of developmental processes among themselves. And with all this, we find masses of associated organic movements — in the bowels and vaso-motor system, with bizarre and uncouth sensations, such as flesh-creeping, shivering, back-crawling, fainting, etc. — shifted and shunted from one connection to another, till they seem to have no reason nor measure in their place and function. But the unreason of it all is itself reasonable, as we now see; and we have no right to complain at results which we have reason for expecting from the carrying out of the general principles of evolution.

CHAPTER IX

Organic Imitation

§ 1. *The General Question*

We may now proceed to examine more carefully the type of reaction in which we have found both Habit and Accommodation to have their rise.

It will be remembered that we found the life process issuing in a great twofold adaptation, — expansions and contractions, — and we saw that the former represent waxing vital processes. Then we went on to say that all special adaptations are secured by the new hold upon beneficial stimulations reached by these expansive, outreaching movements. Thus a 'circular' activity is found in operation; life processes issuing in increased movements, by which in turn the stimulations to the life processes are kept in action. It will also be remembered that we found it necessary to postpone to the present chapter the further consideration of this type of activity.

In our consideration of suggestion we discovered an activity of a similar kind also, a 'circular' activity. We found it well to describe the child's *imitations* in terms of very similar import, and it has been intimated that, since consciousness, of which imitation is generally considered a characteristic, is probably never absent from living organisms, possibly these two cases of 'circular' activity might turn out to be one and the same thing.

Let us now examine this circular type of reaction somewhat more closely, finding our clue without more ado in the analogy between the kind of nervous reaction which we have already seen to fulfil the conditions required by the preceding theory of development, and the mental function called *Imitative Suggestion*.[1]

This has the added advantage that it leads up to further investigation on the side of psychology, and we have the problem of accounting for *mental development*, although we shall consider it throughout as a new stage in the general problem already set for solution in the treatment of biological development.

Imitation is a matter of such familiarity to us all that it goes usually unattended to: so much so that professed psychologists long left it largely undiscussed. Whether it be one of the more ultimate facts or not, we now seem to have some evidence that it has never had its due in psychological theory. If we shall be able to trace its influence in the developed mind, even that will not be without its reward; but it may be possible that the law of the organic processes can be shown to be capable of an interpretation similar to that of the mental.

We may make it a part of our assumption at the start — what I have endeavoured to prove above — that an imitation is an ordinary sensori-motor reaction which finds its differentia in the single fact that it imitates: that is, its peculiarity is found in the locus of its muscular discharge. It is what we have called a 'circular activity' on the bodily side —

[1] See above, Chap. VI., § 4, and Chap. VIII., §§ 1–2. An early statement of 'imitation' in this sense is that of Chevreul. He speaks of it not only as a tendency to movement in a definite direction from the thought of the movement, but also as keeping itself going and so 'accelerating' itself. See his letter to Ampère on 'A Particular Class of Movements,' quoted by Binet, in *Alterations of Personality*, Eng. trans., pp. 222 f.

brain-state due to stimulating conditions, muscular reaction which reproduces or retains the stimulating conditions, same brain-state again due to same stimulating conditions, and so on. The questions to be asked now are these: Where in our psycho-physical theory do we find place for this peculiar 'circular' order of reaction; what is its value in consciousness and in mental development, and how does it itself arise and come to occupy the place it does?

It may be well to repeat that we might expect to find imitations — using the word for the present in this broad organic sense — wherever there is any degree of interaction between a living organism and the external world. The effect of imitation, it is clear, is to make the brain a 'repeating organ,' *i.e.* to secure the repetitions which on all biological theories the organism must have, if it is to develop. The muscular system is, as Eimer and others show, the expression and evidence of this fact. The place of imitation in life development is, therefore, theoretically solvable in two ways: (1) by an examination of living creatures for actual imitations, and (2) by the deduction of this function from the theory of repetition in neurology and psychology — this latter provided we find that Nature does not herself present an environment sufficiently constant to give enough repetitions to supply the demands of neurology and psychology. If this last condition be unfulfilled — that is, if Nature does actually repeat herself through her stimulating agencies, light, sound, etc., sufficiently often and with sufficient regularity to secure nervous and mental development — then imitation may be a side phenomenon, an incident merely. In that case the old biological theory, which uses habit alone with lucky chance, and takes no account of the nervous process of pleasure and pain, or the function of consciousness, in securing accommodations, remains available. But I have already criticised that view.

Without taking up these questions again, I wish, while citing incidentally cases of the occurrence of imitation, to show the importance of repetitions and of the imitative way of securing repetitions, in the progress of mind, and thus to supply further support to what we may call the 'psycho-physical theory of development' outlined in the earlier pages.

If it be true, at the outset, that organic development proceeds by reactions, and if there be the two kinds of reaction usually distinguished, *i.e.* those which involve consciousness as a necessary factor and those which do not, then the first question comes: In which of these categories do imitative reactions fall? Evidently in large measure in the category of consciousness; the child is usually conscious of what he imitates. If we further distinguish this category in so far as it marks the area of conscious life which is 'plum up,' so to speak, against the environment — directly amenable to external stimulation — by the word 'suggestion,' we have thus marked off the most evident surface features of imitation. Imitation is then, so far, an instance of 'suggestive reaction' — another phrase now sufficiently well defined.[1] And this is the most evident meaning of the term 'imitation' in popular and strictly psychological usage. We shall therefore proceed out from this more popular conception.

Now let us look more closely at this kind of consciousness, and find its analogies. A mocking-bird, we say, imitates a sparrow, a beaver imitates an architect, a child imitates his nurse, a man imitates his rector. Calling the idea of the result which the imitator is supposed to have some dim or clear consciousness of, the 'copy,' we find that we are forced to consider this 'consciousness of the copy' very different in these several cases. The copy is clearly defined, certainly, in the child's mind when he imitates a movement; and also in the

[1] See above, Chap. VI.

man's mind, although it is very much more complex and associative, when he imitates his rector. But we have a very different state of consciousness in the parrot or mocking-bird, and this is true even more strikingly in the case of the beaver. Indeed, these four cases are typical divisions in the psychology of action, *i.e.* volition (the man), suggestion (the infant), reflex action (the mocking-bird), instinct (the beaver). Yet suppose I make any one of four remarks to an ordinary man on the street: 'the beaver's dam is a good imitation,' or 'the mocking-bird's song is a good imitation,' or 'the child's movement is a good imitation,' or 'the man's conduct is a good imitation' — this working-man would understand me and accept the opinion with no further explanation on my part and no further questioning on his part.

We see, therefore, that even in popular language, these so-called kinds of action have something in common, and that the word 'imitation' is not greatly strained in expressing this common element. There is in all the instances some kind of constructive idea, a 'copy,' in more or less conscious clearness, which calls the action out, and which it is the business of the imitator to reinstate or bring about somehow for himself. Now, this is just what I wish to inquire into: the nature and significance of this 'copy'; aiming, if possible, to show how all the forms of action which show this common element could have arisen, and what principles of development they imply.

§ 2. *The Neurological Question*

On the physiological side, the simple imitations of childhood present the purest type. And the law of repetition in neurology must be brought in, in some way, to supply its nervous basis. No one probably will be disposed to deny this. We find it possible, also, just as soon as we bring to mind the action of accommodation and habit, no matter what theory we adopt of their mechanism, to show that the element common to the child's imitations, and all the other instances mentioned, is very plain. Current theories agree that voluntary reactions repeated tend to become organic as direct suggestions; that the nervous process becomes smooth through habit; that suggestions repeated tend to become still more independent of consciousness as secondary automatic and reflex reactions, by the same principle; that reflex reactions, when repeated, co-ordinated, and inherited, or selected from congenital variations, become instincts. All this is simply and plainly habit; and habit is due to repetition, no matter, again, how it is secured.

But it is just as clear to current thought that the whole process works also the other way. Instincts are constantly being snubbed, contradicted, disused, modified, until all that is left is an instinctive torso, a fragment, a tendency merely, and this we call, in psychology, impulse; and these impulses, when recognized, ratified, indulged, work up into volitions again. Now, all this reverse process is due to the principle and fact of accommodation, so familiar to us in view of our earlier discussions. And here, again, we may speak only of the facts, leaving out of account all the theory of how it is done.

All this so far is so evident to current thought, that only details are now discussed in the books. It only remains, therefore, to ask whether the self-sustaining type of nervous action, that which is actually present in the child's conscious imitation, — *i.e.* eye-stimulus, then central process, then movement of the child's own member, which itself reinstates the same eye-stimulus, — whether this is present from the first stages of evolution. If so, then habit and accommodation as depicted in the earlier chapter will do the work by its aid; and psychological development can be read as a chapter of biological evolution. But if not, then when in the organic series did conscious imitation arise, and why? For as sure as it is that consciousness gives us imitation at all, so sure is it that the nervous system performs, without any violation of its ordinary methods, the circular process by which the imitation goes on.

This question, I insist again, as I have above, is an urgent one, and admits of only two possible answers: either the neurological analogue of imitation was present from the first, and in conscious imitation becomes explicit as mental accommodation, or it has come in somewhere in the biological series. I have already said that the second alternative might be true, if we allow a certain amount of development under constant conditions before the rise of special differentiated movements of expansion and contraction — as much development as is represented by simple habit in very low organisms whose life is a round of recurring stimulations and reactions.

But it is difficult to see how reactions which represent habit merely could get much complexity. In a constant environment they would soon exhaust the compounding of results due to variety of stimulations. And if the environment changed, this compounding of habits would only make the organism more rigid and less able to adapt itself. The only solution of this point — simply slurred or not seen by most biologists — is that adopted by Spencer in his law of heightened nervous discharge; but this only gave a new factor, which served historically to bring in the nervous process of pleasure and pain, and so to lead to the other alternative given above. We have instances of what mere habit will do, in higher organisms, in the endless repetitions of the same sounds by the weak-minded, by children, and by parrots — continued muscular tension kept up by circular discharge until nervous exhaustion ensues. This is characteristic of cataleptic and hysterical conditions also, as we will have occasion to remark in speaking of *aboulia*. Such persons do not *develop* or *grow*. They are like wound-up mechanical devices, as far as a living organism can in any case be compared with such a self-repeating mechanical device (say a swinging pendulum), which never gets exhausted nor grows.

We should expect accordingly to find evidence of the imitative, *i.e.* self-sustaining, type of reaction in very early organisms.

There is, in fact, a distinct trend in recent biological thought directly toward a construction of this kind. Indeed, this view of nervous adaptation is in line, I think, with the most important and thorough contributions lately made to the theory of organic movement. Two recent investigators have summed up evidence which supplies, in great part, the basis long desiderated for a theory of muscular action and development. Eimer has stated the facts which make it probable that all the "morphological properties of muscle are the result of functional activity."[1] On his view contraction waves leave markings which account for both muscle-fibres and striation. The series of stages in the development of voluntary muscle which biological science is now cognizant of is very striking. That there are no anatomical divisions corresponding to the striation of muscle is shown by recent observations. It remains, then, only to find a physiological conception of contraction which, while applicable primarily to unicellular creatures, should provide for the development of the organism and the differentiation of its parts by repetition of functions, with progressive evolution. Natural history requires, in the words of Engelmann, that "every attempt to explain

[1] *Zeitschrift für wissen. Zoologie*, LIII., suppl. Bd., p. 67. See also his *Organic Evolution;* yet we cannot accept his Lamarckian views of heredity.

the mechanism of protoplasmic movement must extend to all the other phenomena of contractility."[1]

This requirement a recent theory of contractility, that of Max Verworn, seems to me, *in its type*,[2] to go far toward supplying, accordant as it is with the detailed histological results of Kühne, Schultz, Engelmann, and others. The outcome of Verworn's work is a chemical theory of contractility which rests upon two known cases of chemical action. Kühne has proved that the oxygen of the air has chemical affinity for the outer layer of particles of a protoplasmic mass. The elements set free by this union find themselves impelled toward the centre by their affinity for the nuclear elements. This new synthesis releases elements which again move outward toward the oxygen at the surface.[3] Thus there are two contrary movements: away from the nucleus, or expansion, and toward the nucleus, or contraction. Considering the oxygen effect as stimulus, we have thus a reaction which keeps up the action of its own stimulus, and thus perpetuates itself, giving just the type of reaction which the theory outlined above calls 'circular.' Verworn pushes the claim of this type of vital process right up through all the forms of muscular action — just as Eimer finds only the one type of function necessary, with repetition, to account for all the morphological variations. I am certainly, therefore, in touch with biological authorities in

[1] Quoted by Soury, *Revue Philosophique*, July, 1893, p. 45.

[2] *Die Bewegung der lebendigen Substanz* (Jena, 1892). Verworn's work is well summarized by Soury (see last note). Cf. Burdon Sanderson's remarks on 'Chemiotaxis' in *Nature*, Sept. 14, 1893, p. 471. I say 'in its type,' since the particular chemical mode of stimulation which Verworn makes exclusively the basis of life may not be, and probably is not, the only kind of stimulus to which the organism effects the same typical kind of circular reaction.

[3] The exhaustion of the nucleus by stimulation is shown by the work of Hodge, *Changes due to Functional Activity of Nerve Cells* (Boston, 1893).

claiming that this type of reaction is essential to neurological development; and especially so when we come to see, in what follows, that the progress of consciousness can be accounted for in stages corresponding, in its great features, with the stages of differentiation required by the physiological and anatomical theories.

Further, recent researches on the behaviour of unicellular organisms and of plants show the same kind of so-called selective or 'nervous property,' with antithetic adaptations of attraction and repulsion. These creatures develop not by remaining still and awaiting the accidental repetition of stimulations by storming or assault. On the contrary, they do exactly what we have long thought it the exclusive right of higher conscious creatures to do; they go after, or shrink from, a stimulating influence, according as its former impression has been beneficial or damaging.[1] In other words, they perform reactions of the stimulus-maintaining, or imitative, type. Binet[2] draws the conclusion that protozoa have memory, choice, volition; that is, as I should prefer to say, they behave as though they had. Bunge, in his lectures on physiological chemistry, after describing the actions of certain 'apparently quite structureless' creatures, *Vampyrella* and *Colpodella*, says, "The behaviour of these monads in their search after food, and their method of absorbing it, is so remarkable, that one can hardly avoid the conclusion that the acts are those of conscious beings." "Later on," says a writer in the *British Medical Journal*,[3] "he gives the still more remarkable case of the orcellæ. Whenever an attempt is made to place them in an inconvenient position, they are always able by the development of gas

[1] Jennings's work, *Behaviour of Lower Organisms* (1906), is now the best treatise on its topic.

[2] *Psychic Life of Micro-organisms.*

[3] May 12, 1894, p. 1027.

bubbles of appropriate size and at the proper spot, to right themselves . . . etc. 'It cannot be denied,' says Engelmann, 'that these facts point to psychical processes in the protoplasm.'" Late researches showing the effect of lights of different colours upon these elementary creatures is also in evidence. They swarm into certain lights and avoid others. Certain bacteria distinguish the trillionth part of a milligramme of certain substances in solution — showing lively attraction — quantities which the tests of chemical reaction and the finest chemical balances fail to detect. If extract of meat be exposed near these creatures, which feed on it, they swarm toward it from afar, crawling over one another. But just as soon as a little poisonous extract, in the most minute quantity conceivable, be added, the bacteria fly from the mouth of the tubes in haste, with all the external signs of intelligence and fear.

In regard to plants, the recent evidence of their active responses to stimulations of all kinds by extension and retraction is simply remarkable. Pfeffer has shown the conditions of the perpetual movements known as geotropism, hydrotropism, heliotropism in plants. The fact of twining movement in the tendrils of various plants has been subjected by this investigator to delicate tests. He finds that the tendrils of the pea will twine about a thread of silk which exerts a pressure of only the 100,000th part of a milligramme, while the force of the wind and the rain or the constant pressure of a stream of mercury, have no effect whatever. The tendrils distinguish between liquid and solid touches. A wound upon a plant is a signal for a movement of protoplasm throughout the entire plant, and a migration toward the damaged part. "It is," says Pfeffer, "just as if the plant had the power of moving itself. Its sensibility is developed to the highest degree, and it reacts to light, heat, contact, electricity, and chemical influences."[1] The researches of Hegler show that if a weight be attached to a growth stem of a plant, greater mechanical strength is developed in the stem to withstand the weight, a fact analogous to the fact shown by Waller that an isolated muscle is able to do more work when a greater demand is made upon it in the way of resistance.[2] Growing roots show enormously increased growth power when resistances are put in their way. The fruit buds of certain plants resist the action of gravity, growing upward, as long as the germinal vesicles are uninjured. All the other parts of the buds and flower may be cut away, but it still grows serenely up. But only let the germinal vesicles be removed, — parts which in size and weight are infinitesimally smaller than these others, — and the whole bough sinks toward the earth.

The theory adopted by the great botanist mentioned, Pfeffer, in explaining these phenomena, falls in so easily, up to a certain point, with those of Eimer and Verworn already described, that it even suggests the *via media* which is required by the doctrine of accommodation through the law of 'excess' expounded in the foregoing pages. Says Pfeffer: "Having a view to all the particulars in the process of reaction and its effects, we find that the essential principle of all these phenomena is to be looked for in the production of a *central organic response* (*Auslösung*, *détente*, release, or 'trigger-action'). This is the only definition which covers all the phenomena. . . . And it clearly results from it that irritability is never simply the result of the stimuli which bring out the reaction; these only serve to discover the properties and the specific agencies of the organism itself, and

[1] Pfeffer's 'Address at the first general meeting of the Society of German Naturalists and Physicians,' at Nuremberg. See *Revue Scientifique*, Dec. 9, 1893, and *Nature*, April 19, 1894.

[2] *Brain*, XV., p. 388.

that the whole proceedings is due to the peculiar energy of the organism. . . . A simple mechanical action, for example, which represents an equivalent transformation of energy, does not constitute an irritation, although in the chain of phenomena due to irritability, there is more than one such transformation; for there is never irritation without an external or internal stimulant which sets in play the potential energy of the plant. Here we are dealing with phenomena of another order than those of a membrane drawing in water by stretching, or of a cell filling itself by osmosis, or finally of a branch bending under a weight." Further, in certain kinds of reaction, such as heliotropism, etc., Pfeffer points out the ability of the organism to 'release' its energies again and again to the same stimulus, and so to keep its processes a-going: "However little the *ensemble* of effects follow the release automatically, nevertheless the organism may prolong a reaction once provoked, or, after reacting, *re-establish the state favourable to the reaction*."[1] Uniform conditions, also, such as air, temperature, etc., he holds to afford constant stimulation by which the organism is kept in a state of static contraction. Plants continue to grow in forced directions some time after being again set free. "If the temperature remains constant, the plant finds itself in a state of static irritation — a condition necessary to vital activity. It is in this sense that certain permanent influences are general and absolute conditions of the functioning of the organism."[2] This, it is clear, is in full accord with the theory of Verworn and with the oxygen discovery of Engelmann, and recognizes the ability of the lowest organisms to produce already reactions of the circular or imitative type.

The general theory of *Auslösung*, or 'trigger-action,' stated by Pfeffer, is as old, he says, as his work on Physiology (1881),

[1] *Revue Scientifique, loc. cit.*, p. 741. Italics mine. [2] Pfeffer, *loc. cit.*

and his *Osmotische Untersuchungen* (1877), and he also traces it to Dutrochet (1832). This is interesting, I think, on account of its close approach to the heightened nervous energy of Spencer, which also turns upon a storing up of potential energy. Yet I am not able to discover that Pfeffer uses this 'excess' storage for purposes of the further adaptation of the organism: a limitation of view which could not well be avoided in observing the actions of plants alone, which do not, as animals do, learn new adapted movements before our very eyes. He seems simply to recognize it as there, to account for reactions actually observed.[1]

Of course this class of facts, which show the same kind of selective reaction in lower organisms as in the higher, where consciousness is present,[2] may be used to support a certain dualism of chemistry and life. This is done among some later biologists, the so-called 'new vitalists'; but psychologists are becoming so familiar with the problems which demand a reconciliation of form and content, and so willing, for purposes of science, to state everything in terms of content, that this need not trouble them much. It is well to recognize, however, that if organic and mental accommodation are, as I am endeavouring to prove, one and the same thing, then the psychologist may have more right than is customarily given him of solving the dualism in this particular case by interpreting even the affinities of chemistry after analogy with the selective function of consciousness.[3]

[1] Professor Jennings (*loc., cit.*), who advocates the 'trial-and-error' theory of accommodation, insists also upon the complex character of the inner release processes.

[2] See an interesting collection of additional facts showing the 'nervous property' in low organisms, in Orr, *Theory of Development and Heredity*, Chap. IV. The authors cited are so easily accessible that I do not quote further from very many available instances.

[3] As do, among naturalists, Lloyd Morgan, and among philosophers, Paulsen.

The bearing of the present condition of neurological research is now sufficiently evident from the evidence cited. Whatever else it shows, this is clear, that wherever there is life there is irritability, nervous property. Further, wherever there is life there is the spontaneous selection of stimuli and the necessary motor accommodations. Wherever there is life there is means of continuing advantageous stimulations by drawing up to them by active movement, or by other actions whose evident result is the same. Such a property could only have arisen by the natural selection of the organisms which were endowed, by variation or otherwise (or by its abrupt appearance with life itself), with a central physiological process of a kind by which the contracting energies of the organism were directed into certain favourable pathways and withheld from other pathways. This is the principle of 'circular' action with 'motor excess' as worked out above.

All this is equally true of the reactions which are consciously selective or inhibitory; the two great agents of such selection being attention, and pleasure and pain. I accordingly claim that the evidence of biology is in favour of the conclusion that the phenomena of 'excess' in unicellular creatures are, in some way, the nervous analogues to these conscious functions. How they are involved in pleasure and pain states of consciousness has already been touched upon in part. The theory of the rise of attention is to follow below.

The adaptation of all organisms is secured, therefore, by their tendency to act so as to reproduce or maintain stimulations which are beneficial.[1] In this way only can new

[1] Professor C. S. Minot has called my attention to the similarity to this view of that of Pflüger in his 'Teologischen Mechanik der lebendigen Natur' (reprinted from Pflüger's *Archiv*, Bd. XV., 1877). Although reached purely from a physiological point of view, I find Pflüger's idea and illustrations quite consonant with the views of the text. See especially, in the paper cited, § 3, pp. 37 ff., the *teologisches Causalgesetz:* "die Ursache jedes Bedürf-

reactions be made available for repetition, and so secured to habit. But this reaction, which tends to secure a continuation of its own stimulation, is exactly the nervous process of conscious imitation. Hence we may say that all organic adaptation in a changing environment is a phenomenon of *biological or organic imitation.*[1]

§ 3. *The Physical Basis of Memory and Association*

In the nervous processes so far sketched we have, I think, the adequate basis of the development of an organism up to a certain point. It is evident that, in it all, the organism is directly dependent upon the actual stimulating agencies of nature. Sensations, perceptions, objects, are necessary to call out the reactions characteristic of it. And who would

nisses eines lebendigen Wesens ist zugleich die Ursache der Befriedegung des Bedürfnisses."

[1] The use of the word 'imitation' in this wide sense has been justly criticised; but I am at a loss to suggest a better term. Besides, it is the essence of my contention that the method of organic adaptation is by reactions of this identical type with further repetitions of them. The term 'adaptation' is too general. 'Repetition,' the word used by the biologists, is too narrow, since it is only repetitions brought about in part by the organism itself which I have in mind, not all repetitions, as the old biological theory of adaptation is accustomed to hold. One of my correspondents — and so also a critic in the *Academy* — thinks 'habit' covers it; but it is just my point that it *does not* cover it. I am asking just how habit could ever start and be controlled — apart from fortuitous lucky chances. Of course this method of accommodation itself becomes a habit: the fact of imitation by children shows it. But the main function of the thing even then is that of modifying habits by the new actions which the child learns through its imitations. If any one will suggest a more happy term for the reaction *which is at once a new accommodation to any sort of stimulation and the beginning of a habit or tendency to get that sort of stimulation again,* I shall hail it gladly. In the meantime I use the word which expresses the *type* to which the reaction undoubtedly belongs, even at the risk of being charged with a desire to *psychologize* the facts of biology; but I do not wish, of course, to prejudice the argument by a word ill-used and suggest 'circular reaction' as an alternative.

expect that the organism could in any way escape this dependence? Yet we have already found, in the fact of pleasure and pain reactions, that the organism takes active attitudes toward the sources of stimulation and thus in a measure turns the events of its environment to better account. But this is only the start: the marvels of development are not yet well begun!

Is the occurrence of any reaction, we may ask, possible in the absence of the external stimulus which is suited to start it? Evidently it is not possible, unless there be some way whereby the energies of the reaction in question may be started by something equivalent to the working of the original external stimulus.

We have seen how it is that the organism goes out to find its stimulus by a kind of imitation; we now find the still more remarkable fact for which this only is the preparation — but the necessary preparation — the fact of *memory*. Memory is, as everybody says, on the bodily side, the reinstatement in the nervous centres of the processes concerned in the original perception, sensation, etc., or of others that stand for them. These processes, of course, tend always, when started, to issue in movement, just the same, no matter how they themselves are started. So the function of the reinstatement of processes in the act of memory is, in respect to the tendency to action which these processes arouse, essentially the same as that of the processes of perception, sensation, or other event which furnished the original of the memory.

But in memory the object or thing remembered is itself absent; yet inasmuch as its proper reaction in movement comes about just the same, we have a new stage in what is still our old friend the 'circular,' the 'stimulus-retaining,' reaction. It gets started from the brain centres to be sure, but it aims, just the same, to bring about the consequences which it did when it was directly started by the sense-stimulation. It aims, that is, to bring the organism into touch with the stimulation itself again if it be a desirable one, or, in contrary cases, to get the organism away from the stimulation.

This is accomplished in the organism by an arrangement whereby a group of processes, corresponding to what we call in consciousness 'copies for imitation,' some of them external as things, some internal as memories, conspire, so to speak, to 'ring up' one another. When an external stimulus starts one of them, that starts up others in the centres, and all the reactions which wait upon these several processes tend to realize themselves. So, many reactions which, but for this, would never get stimulated except when the actual material stimulus is there, are started by and with others whose stimuli are there. And with the multiplying of these secondary or remote ways of stimulation, the more and more varied and complex habits of the organism come to be less dependent upon the particular external events of the world, and more capable of remote stimulation through senses which originally did not constitute their stimulus, but which by this organic 'conspiracy,' called — I may as well anticipate — *association*, come to do so; while the increasing variety of the conspiring elements — constantly recruited from the new experiences of the world and all represented by certain nervous processes — make up a large and ever larger mass of connected centres, which vibrate in delicate counterpoise together.

The arrangement thus sketched, therefore, is the physical basis of memory. A memory is a copy for imitation taken over from the world into consciousness. Memory is a device to nullify distance in space and time. It remedies lack of immediate connection with the come-and-go occurrences of the world and makes the organism to a degree independent of them. Every act I set myself to do is either to imitate something which I find now before me, or to reproduce, by my own action, something whose elements I remember — something whose copy I get set within me by a 'ring up' from elements which are events or objects in the world now before me.

This neurological theory of memory, advanced with too great brevity, is along the lines already announced by Tarde and others.[1] Tarde's theory, which I find obscure, is improved in quotation, and indorsed by Sighele.[2] It may be analyzed into two factors, *i.e.* (*a*) the securing of repetitions by imitation, a speculative idea based upon the mere fact that animals and man do consciously imitate; and (*b*) the theory of memory, considered as a means of perpetuating and complicating the effects of repetition in mental development. This latter factor I find only vaguely and inadequately stated by Tarde. It is readily seen that his view, also, assumes the fact of conscious or semi-conscious imitation, makes of it an original endowment or kind of social instinct, and is, in so far, open to the objections which may be urged[3] against such a position from the point of view of development; for one of the great problems of the theory of development is to account for instincts of all kinds. And, moreover, of all instincts the social are possibly the most complex and the latest. They involve a great measure of the individual organic and mental attainment found in memory, imagination, emotion, etc.

[1] *Les Lois de l'Imitation*, Chap. III.; published earlier in an article 'Qu'est-ce qu'une Société,' *Revue Philosophique*, XVIII., 1884, p. 489.

[2] *La foule criminelle*, pp. 42 ff.

[3] Cf. Bain, *Senses and Intellect*, 3d ed., pp. 413 ff., mentioned again below.

The theory now proposed, on the other hand, aims at supplying this lack. It gives a derivation of imitation based upon an analysis of the imitative reaction itself. This analysis — the outcome of which we have expressed by calling imitation a 'circular reaction,' *i.e.* one which tends to keep up its own stimulating process — gives us a means of defining imitation and fixing the limits of the concept.[1] The third and fundamental factor, therefore, which the development stated above, compared with the earlier theories, endeavours to supply, is the theory of the rise of imitation itself from the simple vital processes of an organism through the occurrence, among 'spontaneous life variations' of creatures whose vital discharges are movements of the 'circular' type, which tend directly to secure the repetition or maintenance of certain good stimuli. And, in like manner, the suppression of reactions which are damaging or useless follows, for by that very fact they lower the vitality of the organism and so hinder their own recurrence. This derivation of imitation secured, we are able to develop independently the two principles urged by Tarde and Sighele, on both sides, the bodily and the mental.

We reach now a new stage in race history. As habit goes on forming, accommodation enters in a new form. New reactions which prove to be beneficial, have themselves to become matters of habit, have to be accommodated to by the organism as a whole, have to be taken up into the network of conspiring processes which represent the sum of adaptations to date, being stereotyped in the race by natural

[1] Cf. Tönnies' remarks on Tarde's book in *Philos. Monatshefte*, 1893, p. 298, showing the need of more definition in this whole field. The relation of my views on imitation to those of M. Tarde is made matter of explicit remark in the Preface to *Social and Ethical Interpretations*, 3d ed.

selection. Here it is that the principle of association largely gets its great value in nervous and mental development.

We have found reason to think that mere repetition with association would not suffice for development, and that the principle of 'organic imitation' must be added, for the reason that association alone would simply render habits more compact. This is true also in higher development after the process of memory comes; yet here association has much wider application. For example, a child does not learn to speak by merely getting his accidental vocal muscular sensations associated with the significant sounds which he makes, though I know that this is a widespread view. For at that rate of learning the number of words in his vocabulary would be less than the number of days in his life. On the contrary, he yields to his tendency to imitate sounds, and by strenuous effort succeeds, thus getting a great number of significant sounds and their necessary muscular sensations. This, now, becomes association's opportunity to show the manner of its action — a chance it could not have had otherwise. And it does.

Nervous association does two things. First, it does here what it has been seen to do in the lower organisms: it binds sense of stimulus and sense of movement together. The child who has learned to make a sound, then makes it by association whenever he hears it. But second, association does more, — and here comes in the very great influence of the fact which we have been describing by the phrase 'central conspiracy,' — association brings different reactions together as wholes; it links together the elements of copy at the centre, so that a stimulus may produce, not only its own associated reaction, but, by its association with another stimulus, or with the *memory* of that other, it may suffice to produce the reaction associated with the second stimulus, or a third, fourth, etc. This we have already seen in the fact of 'substitution' in the matter of emotional attitudes.[1]

The play of this form of association and its importance appear on the mental side in the detailed facts of conscious association. This is mentioned below and traced further. Suffice it to say that the brain is a great mass of such sensory and motor processes bound together by 'association fibres,' all attesting the growth of the organ, as a whole, by the action of association upon simple functions. The fact that brains differ from one another only in degree of associative complexity, and the further fact that all complex brain functions arise from the complication of simple reactive functions, — these facts are now axioms of physiology. There are two general truths involved, however, which are suggestive for our present topic.

The actual exercise of the most complex voluntary function involved in thought and conduct involves the motor apparatus which is also used by the simple reflex processes.[2] This has further mention in the chapter on 'Volition.' We are able to see now more clearly the reason for it. The new more complex functions are born out of the old simple ones by this principle of organic association. They are higher co-ordinations in which the lower enter as necessary elements. The apparatus of the old cannot be superseded; that would take away the basis for the new. All development is evolution. When an object approaches my eye, the lid flies to. But I use the same muscle when I will to wink my eye. In the one case, I stimulate the motor process by a percept or memory process, associated with the motor lid-

[1] Above, Chap. VIII., § 4.

[2] See Chauveau on 'The Sensori-motor Nerve Circuit of Muscles' in *Brain*, 1891, pp. 145 ff., and Exner on 'Senso-mobilität' in Pflüger's *Archiv für die gesammte Physiologie*, XLVIII., 592 ff.

movement process; in the other case, the same motor process is stimulated by an outside event.

The evident fact to be noticed, then, is that the more fixed of the two sides — sensor and motor — of the neural apparatus, is the motor side. It represents the *habits*, the organism's own repeated responses by apparatus which the different senses and the higher mental processes use in common. It also represents the great antithesis of ebb and flow in the vital processes into the terms of which all sorts of stimulation are translated: while the sensory side represents the shifting, varying life of stimulation; the relativities, the modifications, the reasons for *accommodation*, in short. The sensory centres have been likened by James to a funnel, which pours its flood down into the motor channel. Stimulations can be accommodated to only so far as the processes they excite can be drawn off successfully in the motor channels established by habit. *Motor-habit, then, is the measure of nervous and mental unity.* As we shall see below,[1] the sense of it affords largely the permanence, identity, self-persistence of the whole mental system.

A second fact of great importance arises from the increased complexity of associations in the brain. We have seen the elements of it in the association which one sensory process may form with a certain motor process through its earlier association with another sensory process more directly connected with the same motor process. The oft-cited instance of the burnt child dreading the fire is a case of it. The burn is at first associated organically with the withdrawing movement; but the sight of the blaze also entered originally into the complex experience of the fire. So the sight of the blaze now comes to bring about the withdrawing movements directly, although at first it was only the burn

[1] Chap. X., § 3, and Chap. XI., § 1.

and its pain that were agents capable of doing it. Or, put in terms of pleasure and advancing movements: the child sees — tastes — grasps an apple. The next time he sees an apple, he grasps at it before he gets the taste. If we note well that the first order is imitative, *i.e.* taste, then grasping to secure the taste again, and note also that it is by simple association, merely, that the real stimulus, taste, disappears largely from the series — we are at once able to give a new meaning to the principle of association. The original imitative type seems entirely to disappear from the act as soon as the child gets the second order, seeing — grasping — tasting; and yet without imitation the reaction necessary to the association itself would not have been learned. It is possible to say, therefore, as our former chapters would lead us to expect, that each new accommodation secured by central nervous development is not new at all in principle, but rests directly upon imitation and association. Its characteristic feature, however, is its complexity. And this complexity is of such a kind that reactions *seem to lose altogether the stimulus-repeating or imitative character which they had to have at first.*

On the nervous side, this result is secured by the formation, between different brain areas, of direct connections, which take the place of the roundabout connections first painfully learned. Pathology is full of cases which illustrate it. Speech is learned by direct imitation through the ear, but afterwards gets to be stimulated through the eye; that is, a direct connection is formed from the optical verbal to the motor speech centre, and takes the place of the course through the auditory verbal centre. And it is now common doctrine, as I have said above, that the briefer, more automatic functions may represent, by neurological short-cuts, a long series of earlier processes.

This is the secret, also, this fact of associative short-cuts, of the abbreviating of phylogenesis by ontogenesis, — already noted above.[1] It may be well to repeat the point, now that we have had so much to do with neurology. Once let such a short-cut get so well established that it represents a more powerful organic tendency of habit than the longer process which in its genesis it represents; or once let the short-cut break in upon connections formerly used by the long — and this result it becomes the business of heredity or natural selection to preserve. The child, in his own growth, cannot develop instincts for the performance of activities which he is also to learn to perform voluntarily; for the acquisition of volition involves the use in new forms of the very elements which would be held fast in the fixed reflexes of instinct. He is accordingly born a human infant without developed instincts, not a brute with them. His nervous system in its embryonic development does not fully carry out all the details of its ancestral history, but abbreviates them by a short-cut direct to the volitional stage, omitting the instinctive stage almost altogether.[2] Darwin notes the same falling away of certain simple social emotions which in his view lie at the basis of the ethical, when once these ethical feelings have become well established.[3]

We are able, therefore, in view of the foregoing expositions, to make the following general statement: *the action of the*

[1] Chap. I., § 4.

[2] Professor Minot suggests that "this point might be extended generally to the effects of disuse in biology — *i.e.* the loss of characters." Such a position strongly favours a Darwinian or selective view of the origin of characters.

[3] *Exp. of the Emotions*, p. 69. I see hardly any limit to the application of this principle in the hands of evolutionists. Whatever seems native, *à priori*, may be held to be an outcome whose preparatory stages have been lost by the principle of abbreviation. See my own use of it, below, in finding the genesis of the sense of identity and sufficient reason (Chap. XI., § 1).

cerebral centres concerned in memory is sufficiently accounted for as a development from the simple reactions of the imitative or 'circular' type. In these higher functions the principle of habit as applied to compounded reactions, fixed by selection, takes on the broader form commonly known as nervous 'association.'

And yet one additional remark. Just as soon as the copy for imitation becomes a matter of memory, a thing 'rung up' in the nervous centres and so already fully there in the organism, both in its sensory presence and in its motor worth, then it is no longer a thing *to be* accommodated to. It is then a thing *already* accommodated to. Its influence then is to fix more and more steadily the reaction associated with it at first by effortful imitation, so that its present imitation — its circular process — is now an agent of habit. Notice the great utility of the infant's incessant repetition of its own sounds, words, movements, etc., in exercising the organs and strengthening its nascent powers. The same is seen in the scale of race progress — a species refining and fixing what it has already acquired — in the fixing of instincts through the instinctive imitation of some animals by others, by their young, etc.,[1] made much of by Wallace.

As the processes in consciousness fall away, the reaction becomes more reflex. So by the extraordinary cunning of the organism, the very means of its new adaptations, that by which its old habits are modified and broken up, its imitative reinstatement of its experiences even at the high level of memory, this becomes itself a *thing of habit*, just as it does at the lower level of simple motor adjustment; sinks down to

[1] Observations bearing on this latter aspect of the case, with quotations from Wallace and Romanes, are cited by Morgan, *loc. cit.*, pp. 454 ff.; such as the constant dependence of certain birds' nest-building instinct upon the sight of their home nests, etc.

the lower levels of brain co-ordination; and is found actually in the child or animal as an impulse to imitate itself. But in the child the impulse to imitate is a matter of *consciousness.* The mental copy, imagined, remembered, is set up and aimed at; imitation is no longer the organism's weapon; it is now the sword of mind, as the following chapters on 'Conscious Imitation' aim to make clear.[1]

[1] Professor Lloyd Morgan says, in criticising my usage (*Habit and Instinct*, p. 168), that the word 'imitation' should be confined to "the repetition by one individual of the behaviour of another individual." Yet what is the difference between my actions when I do what I see you do and when I do what I think or imagine you, me, or some one else doing? *In defining the reaction as such,* it is impossible to maintain the social criterion. The term 'self-imitation,' used in the text, and also independently suggested by Royce, is sufficient to mark the absence of the social reference in a particular case.

PART III

PSYCHOLOGICAL GENESIS

CHAPTER X

Conscious Imitation (begun); the Origin of Memory and Imagination

§ 1. *Certain General Facts and Explanations*

We are now clear of neurological considerations in the main, and may trace the development of consciousness. The place of consciousness in phylogenetic progress has already come up for notice, and we have been able to find in consciousness a higher sphere of organic accommodation. That is, it seemed necessary to assume the analogue of the nervous basis of pleasure and pain very early in the life series, in order to get any complexity of development at all. Assuming, moreover, the truth of our theory of development as now sketched, which bases it, from the start, on the two factors, contractility, and the pleasure and pain analogue found in central 'excess,' we ought now to find the further development of consciousness an illustration of the same processes.

The rest of our discussions, therefore, may turn upon further analyses of conscious states, whose reason for being is evident only when we connect them with the function of consciousness in evolution as a whole. And as it is the essence of our doctrine of accommodation that the imitative reaction is the type of all organic accommodations, our further interesting task becomes that of tracing and explaining the presence of imitation in the development of consciousness.

We may preface our detailed treatment of this topic with two statements already put in evidence, both of which are the clear outcome of current psychological opinion. I quote them from my earlier work, in which they appear as the natural result of a statement of nervous structure and function in its relation to consciousness, written for purposes of exposition only.

"All the phenomena of consolidation or 'downward growth,' on the one hand, illustrate what is known as the law of *Habit;* all the phenomena of specialization, or 'upward growth,' illustrate the law of *Accommodation.*

"*As for Habit:* Physiologically, habit means readiness for function, produced by previous exercise of the function. Anatomically, it means the arrangement of elements more suitably for a function, in consequence of former modifications of arrangement through that function. *Psychologically, it means loss of oversight, diffusion of attention, subsiding consciousness.*

"*As for Accommodation:* Physiologically and anatomically, it means the breaking up of a habit, the widening of the organic for the reception or accommodation of new conditions. *Psychologically, it means reviving consciousness, concentration of attention, voluntary control — the mental state which has its most general expression in what we know as Interest.* In habit and interest we find the psychological poles corresponding to the lowest and the highest in the activities of the nervous system." The application of these conclusions, especially those italicized, will be plain as we go on.

The books on psychology which have had the courage to say anything about imitation — and they are few — have generally, by what they said, only tended to justify the conservatism of those which had not the courage. It has been a topic of extraordinary neglect and confusion.[1] One of the latest authors [2] makes certain statements about imitation which may be considered typical of the uncertainty which seems to shield itself behind eclecticism.

He says (p. 218): "Since it only begins to appear about the fourth month, when simple *voluntary* action directed towards an end is also first recognizable, it is possible that imitation is acquired"; then (219), "As a rapid reaction of a sensori-motor form, it has the look of a mechanical process . . . in many cases there seems to be no conscious purpose. . . . There is much to favour the view that it is purely ideo-motor and so sub-volitional"; then (219, note), "It is pointed out by Gurney that imitation plays a conspicuous part in the hypnotic state"; and again (219-220), "Imitation follows on the persistence of motor-ideas *having a pleasurable interest*. . . . The child does not imitate *all* the actions it sees, but only certain ones which specially impress it. . . . Hence in most, at least, of a child's imitation there is a rudiment of desire. For the rest, the abundant imitative activity of early life illustrates the strength of the *playful* impulse, of the disposition to indulge in motor activity for the sake of its intrinsic pleasurableness" (italics his). Again (109), he makes imitative sympathy instinctive.

And yet if we examine these separate statements, we find that they rest generally upon fact, and it becomes evident that the need in this topic is a theory of the reaction in question which will cover facts drawn from an area wider than that which individual or analytic psychology is usually called upon to cover. It may therefore be taken as the legitimate task of such a theory as mine, which not only recognizes imitation

[1] To this Professor Bain's work was an early and admirable exception. The literature of imitation is now full and valuable (1906).

[2] Sully, *The Human Mind*.

but endeavours also to explain it, to set in order the facts cited by psychologists.

FACT 1. The late rise of conscious imitation in the child: sixth or seventh month. This fact may be accounted for on the very evident ground of the distinction of congenital function from the new accommodations of the individual child. The child's early months are taken up with its vegetative functions. The machinery of heredity is working itself out in a new individual. Further, accidental imitations struck by him do not give pleasure until the senses are sharpened to discern them, and until the attention is capable of its operations of comparison, co-ordination, etc.; before this there is no element of pleasure in the happy successes of imitations, to lend its influence for the continuance of them. As soon as these conditions get fulfilled, however, we find not only that the child begins to show germinal imitations, such as the monotonous repetition of its own vocal performances (ma-ma-ma-), but also that its nervous connections give it an instinctive tendency to biological subconscious reactions, distinctly of the imitative type, such as the walking alternation of the legs. In the main, therefore, there is instinctive tendency to functions of the imitative type and to some direct organic imitations; but those clear conscious imitations which represent new accommodations and acquirements are not as such instinctive, but come later as individual acquirements.[1]

FACT 2. Imitation is often a simple sensori-motor reaction without conscious purpose, *i.e.* it is involuntary. This is so evident that we have based an important distinction on it in an earlier chapter — that between 'simple' imitation,

[1] The term 'instinctive' used here is in the sense of impulse or disposition rather than of definite instinct in the narrow sense. Cf. the discussions of Groos in *The Play of Man*, together with the editor's preface to the English translation.

considered as 'suggestion,' and 'persistent' imitation, which turns out to be the first typical exhibition of volition. In hypnotic conditions, imitation is clearly ideo-motor suggestion. This means that, after all, imitation considered as a type of reaction, is organic and inherited. It has its place among race habits. Infants show remarkable differences, for example, in the readiness and facility with which they learn to speak. This does not arise from difference in practice, for practice never overcomes the difference; but it is due to differences in the instinctive tendencies of the infants to a reaction which is, *par excellence*, imitative in its type and method of development.[1]

On this basis it is possible to admit the truth of the first fact cited, that many imitations are late acquisitions in the child's first year, and are, therefore, phenomena of accommodation, and acquired things involving volition or purpose; and, at the same time, admit reflex imitations and explain them.

Further, our theory requires, as a matter of fact, just this state of things. Volition would be impossible without this great class of quite involuntary sensori-motor and ideo-motor, as well as purely biological reactions, which fall under the imitative type, and which represent instinctive inherited tendencies to movement. In more undeveloped consciousness, also, we find that the purely suggestive influence of a 'copy for imitation' may be so strong, as is remarked further below, that reactions follow despite their painful character: a fact which would be impossible on the theory that all voluntary action is acquired under lead of the pleasure-pain association, without such a basis of native tendency. The law of habit, which exhibits itself in the congenital motor

[1] The same is true of handwriting; cf. Romanes, *Mental Evolution in Animals*, p. 194.

tendencies spoken of above, is in these cases too strong for the law of accommodation through pleasure and pain, and works itself out in conduct in opposition to warnings of temporary damage to the organism.

Again, not only is this true of imitation itself considered as a phenomenon. It is true of all motor acquisitions, *i.e.* that they may become instinctive in some cases, and yet must be acquired in others.[1] I have already pointed this out in the case of many instincts and of emotional expression. The chick is born with full-fledged space instincts; man acquires 'intuitions' of space relations, and in such a finished way that Kant thinks them native. Beasts in many cases seem to inherit their vocal cries; man learns his speech, indeed, but learns it so well that it gets to be reflex, as is seen in certain aboulic patients. And in many cases the original process of learning is seen to be identical with imitation from the fact that many animals do not learn their characteristic cries, as birds their songs, if they do not hear adults of their kind make such sounds, although they apparently never consciously imitate their adults at all. The instinct of imitation is so bound up in all these race acquisitions or habits that its exercise is often necessary to bring them out.

FACT 3. Children are more imitative than animals, with one or two striking exceptions, such as monkeys, the mocking-bird, etc. This is due simply to the fact that the child's life, as heredity has laid it out for him, is to be largely one of acquisitions or new adjustments, while the animal's is to be one of repetitions of race habits or old adjustments. In the words of Preyer,[2] "the more kinds of co-ordinated move-

[1] This is considered, under the head of 'duplicated functions,' in the discussion of organic selection in *Development and Evolution*, pp. 72 ff., and 28 ff.

[2] *Physiologie des Embryos*, p. 545.

ment an animal brings into the world, the fewer is he able to learn afterwards." The child is *par excellence* the animal that learns; and if imitation is the way to learn, he has 'chosen the better part' in being more imitative than the rest. He is born with a more 'broken up' or mobile nervous organization, because his immediate ancestors have had full consciousness and volition, whose function is to secure new adaptations by choice, memory, etc., in opposition to the old reflex adaptations of animal instinct. The long period of his infancy has come with this mobility and relative helplessness, to give him time to acquire these higher conscious adaptations.

Animal imitativeness is generally understated, however.[1] The most social animals, including man, are the most imitative, as we should expect from what we know about the imitation factor in the social consciousness, and this would seem also to give us an explanation of the strength of the imitative tendency in certain animals which show it strongly marked.

Another reason for the difference is to be found in the fact that we are usually looking for a particular kind of imitation in the cases of animals — the imitation of acts which they do not normally perform. The animals have so much instinctive endowment that most of their performances are taken as a matter of nature, and only those clear cases of imitation are noted which are novel and rare. Yet it is probable that many of the most 'innate' powers of the animals are brought out, perfected, and constantly kept efficient, by imitation within the group or species. In these cases the presence of imitation can only be detected by the artificial separation of mate from mate, young from young, etc.; but interesting cases of crippled performances in circumstances of such separation are coming

[1] Cf. the remarkable performances of dogs, cats, birds, etc., in the way of imitation, given by Romanes, *Evol. of Mind in Animals*, Chap. XIV.

to light, such as the abortive crowing of young cocks, the failure in barking of young dogs, the loss of the form of nest-building in young birds, when the example of their elders is ruled out in these instances respectively.[1]

FACT 4. The tendency to imitate may come into direct conflict with the prudential teachings of pleasure and pain, and yet may be acted upon. *A child may do, and keep on doing, imitations which cause him pain.*

This may be readily explained when we take the facts simply in hand, and rid ourselves of current doctrines of ethics and theories of conduct. If imitation is anything like the fundamental fact which the foregoing account takes it to be, — the means of selection among varied external stimulations, — it becomes evident in what ways pleasure and pain may be related to such reactions. Pleasure and pain are now seen to be the index of a change brought about by a stimulus or by a reaction itself considered as a new stimulus. The repetition of this stimulus is desirable, and this is secured by further imitation. The pleasure is enhanced by the repetition, which thus aims at securing the continued presence of the 'copy'; that is to say, the pleasure accruing is something additional to the copy or 'object' which the original reaction aims at.

The observation of young children directly and plainly confirms the truth of this position. The child invariably reacts at first upon objects, presentations, things present to it. So in some circumstances, suggestion, serving to urge him on to new accommodations, or simply calling out an old

[1] Professor Lloyd Morgan gives many instructive examples of the influence of these accommodations on evolution, as illustrating the theory of Organic Selection (cf. *Development and Evolution*, Chaps. V.–VII.). Since the above was written, it has been pretty well established that animal imitations are largely restricted to functions natural to the species in each case.

habit into exercise, works in spite of the pleasure or pain to which it may give rise. I have illustrated this [1] with concrete cases from infant life. Romanes finds it in the animal world.[2] Pathology is full of striking illustration of it.

Further, the transition from this naïve suggestibility to the reflective consciousness in which pleasures and pains become considerations or ends, is marked in the life history of the infant. He learns to dally with his bottle, to postpone his enjoyment, to subordinate a present to a distant pleasure, by a gradual process of reflective self-control. He gradually grows out of the quasi-neutrality of habit to be a reflective egotist.

In adult life it is undoubtedly true that we usually do things because we like to do them and stop doing them when they hurt, but even then it is not always so. Just as the little child sometimes acts from mere suggestion, at the same time moved to tears by the anticipation of pain to result from it; so to the man a copy may be presented so strongly for imitation, it may be so moving by its simple suggestiveness, that he acts upon it even though it have a hedonic colouring of pain. The principle of accommodation requires that it be so, for otherwise there could be no development, except within the very narrow range afforded by accidental discharges. No new adjustment or adaptation could be effected without risk of pain and damage. If the child never reacted in any way but in pleasurable ways guaranteed already by its inheritance or by its experience, how could it grow? So if we sought only what we have already grown to like, how could new appetites be acquired? The ethical

[1] Chap. VI., § 3, on 'Deliberative Suggestion.'

[2] "There is abundant evidence of one individual imitating the habits of another individual, whether the action imitated be beneficial or useless" (*Mental Evolution in Animals*, p. 220).

truth that pain is a schoolmaster, that we cannot dispense with its discipline and also grow — this truth holds as well in a measure for the vital organism and its reactions.

But the question then remains: How is this possible, if the criterion of what is advantageous is pleasure, and if the organism has developed all the way through on that principle? How can imitation, dictated itself by pleasure and pain, come to conflict with the indications of pleasure and pain?

The answer to this seeming difficulty is evident when we remember one of the points already made. The accommodation-reaction — the imitation dictated by pleasure and pain — is so regular in its kind, giving the circular process, and involves organic elements so much the same, that it has itself become a matter of habit. The tendency to imitate has thus become a congenital thing, given by endowment in the motor organism. The idea of a movement has become, as psychologists so often tell us, itself a tendency to perform that movement; yea, the very beginning of the movement. The child is therefore actuated by all the impetus of race history to imitate, to use his own motor apparatus upon every hint which he gets of a movement, and this tendency takes, of course, no account of exceptions. The pain, therefore, in which a certain new reaction results is, at first, only a partial check upon the reaction. It is, of course, in so far a new accommodation, and works by association, as far as it can do so, to inhibit the movement; but its influence is 'uphill.' It cannot once for all undo the old congenital tendency. And for a time the latter wins the day.

When reflection begins, however, and with it volition, then the case is altered. Volition is not possible until just the breaking up, modifying, snubbing, of inherited habit, which it is the office of new pains and pleasures to bring about, is, to a degree, already accomplished. And volition is no more than just the ratification of this break-up, and the further accommodation to the conditions which have brought about the 'break-up.' Man then becomes an agent. He reflects upon both the old and the new, and his choice represents the best adjustment into which all the elements and tendencies within him may fall for future reaction or conduct. But then the fight with the dictates of pleasure and pain may become only more open, in the degree in which, in his deliberation, he may discern the permanent adaptations represented by self-denial, social co-operation, etc., as opposed to the temporary ones of pleasure and pain.

§ 2. *The Origin of Memory and Association of Ideas*

The neurological function already described as 'the physical basis of memory,' [1] and the manner of its rise, will at once suggest the psychological doctrine as well. We have found the organism developing a system of centres and nerve-connections for the purpose of being relieved of its dependence upon direct sense-stimulation. By this arrangement the processes corresponding to the memory of these sense experiences are aroused from within, from other centres, or from without indirectly, by associated processes, in lieu of the action of the real original object. Such a process thus started gives to consciousness the picture or image of the object, which we call a 'memory.'

If, now, to keep within consciousness, the original sensation-content, — the stimulus which it is the business of the reaction to confirm by repeating, or to banish by failing to repeat, thus illustrating imitation, — if this be considered as respects the reaction which it arouses, then we may have

[1] Above, Chap. IX., § 3.

the same function in kind ascribed to the memory copy as to it. But the reaction will then have another office; its province will be to enable the organism to *anticipate* experiences, the consequences of which it has once suffered or enjoyed. It thus performs its life-preserving reaction before the real stimulus comes, and so secures benefit, or avoids damage. The child *remembers* the flame and the pain, and *withdraws before the fire touches him.* He *remembers* the apple, and the pleasure, and *secures the fruit for himself by reaching.*

Further, we have seen how, on the neurological side, the processes ring one another up, so that one may release the reaction which originally belonged by right of imitation only to another. The question on the side of consciousness, as to how the different 'copies' get to ring one another up, in such a system, is the question of association.

They can at first act together, it is plain, only as far as the original external things *are* together. For example, you speak a word; I at once write it. I can do this because I heard the word sound when I saw the written word and learned to trace it. To-morrow, by reason of a brain lesion, I am unable to write the word when I hear you speak it, but I can still copy the word when you set it before me. The lesion has simply deprived me of the use of the internal visual copy which I imitated in writing, by cutting the writing-reaction apparatus off from its connection with the auditory seat from which this visual copy was accustomed to be 'rung up.' But the simpler imitation of the external visual copy remains possible. A step further: I see a man, and at once write his name. Here the visual image of the man rings up the auditory image of the name-word, this rings up the visual copy-image of the written word, and this I imitate by writing. But all of these images were once real external things to me and existed together, in my learning, by various twos and threes. Yet if any one had asked me why I wrote the man's name, I should have said: 'Because I remember it.' Each one of these images is itself a 'copy for imitation,' when needed for its own appropriate reaction, and only by such associations does its typical character become obscured. A young child, on seeing the man, would say 'Man,' *i.e.* would imitate the auditory copy which the sight of the man rang up. And a certain child of mine would probably hasten to ask for a pencil in order to draw the man, thus imitating the schematic outline man fixed in her memory by earlier efforts to imitate the shape of the real thing. In all these cases the reaction follows either directly upon an external stimulus or upon a memory image which represents another external thing existing at some time alongside the first.

In other words, *association by contiguity* is simply the progress from external togetherness into internal togetherness, from fact to memory. Your spoken word brings up my written word copy. Why? Because sound and written copy existed together when I learned to write, and so on with all the instances.

But suppose a perfectly new external copy rings up another copy which is only internal: why is this? Thus a new man seen brings up an old name written. Why? Evidently because there are some other elements of copy either external or internal which have been together with each; this is association by resemblance or contrast. 'Man seen' and 'name heard' were present together when I made the old acquaintance, and afterwards 'name heard' and 'name written' were associated by contiguity. So when I hear the same name, when in conversation with a new face, I think of the written name. The sound name, therefore, has been common to both associations, and by it the written name arises when I see the new acquaintance.

I have used this last example, rather than the usual ones of the text-books drawn from direct resemblance (a photograph suggesting a man [1]), because it is evident that such association by resemblance is only a special and very open case of what is elsewhere called the principle of 'lapsed links.' In this case, the auditory sound image is just as truly a link between the new acquaintance's face and the written name of the old one, or between my images of the two faces, one in memory and one in perception, as actual similarity of feature would be. In such ordinary feature-resemblance both copies are in the same sense — the two faces are both seen. But similarity, so called, is really a much wider thing. Another centre — the auditory, in the case supposed — may come between, as a link.

Then this link lapses. I tend to behave toward the new man as I would toward the old; even speaking the same name to him is behaviour, of course. The new copy comes to usurp, so far as it may, the reaction belonging to the old, leaving out the link of association altogether.

Take another case: a musician plays by reading printed notes, and forgets that in learning the meaning of the notes he imitated the movements and sounds which his instructor made; for the intermediate copies have so fallen away that his performance seems to offer no surface imitation at all, and pathological cases show that even the intervening brain processes become unnecessary, a 'short-cut' being established between sight and movement. His hearing copy-system persists to the end only to guide or control his muscular reactions. But a musician of the visual type may go farther. He may

[1] See my *Handbook, Senses and Intellect*, Chap. XI.

play from memory of the printed notes; that is, he may play from a transformed visual copy of notes which themselves are but shorthand, or substitute, expressions of earlier sound and muscular copies; and finally the name alone of a familiar selection may be sufficient to start a performance guided only by a subconscious muscular copy series. So also in the case of the patient who can move a limb only when he sees it; we have to suppose that his properly imitative action on the basis of movement memories is now performed through the substitution of visual images for these.

Reflection convinces us that we have now reached a principle — when due weight is also given to the explanations earlier made on the neurological side [1] — of wide-reaching application in mental development. We see how it is possible for reactions which were originally simple imitative suggestions to lose all appearance of their true origin. Copy-links at first distinctly present as external things, and afterwards present with almost equal distinctness as internal memories, may become quite lost in the rapid progress of consciousness. New connections get established in the network of association, and motor discharges get stimulated thus *which were possible at first only by imitation and owed their formation to it.*

If this principle should be proved to be of universal application, we would then be able to say that *every intelligent action is stimulated by imitative copies whose presence the action in question tends to maintain, suppress, or modify.*[2]

A further confirmation of the fact is seen in the process of learning to name objects. The child gets the required word by direct imitation of the sound heard by him. The application of the word to the object keeps his interest and

[1] Above, Chap. IX., § 3. [2] See Appendix C, I.

stimulates his effort, but it is no part of his learning. But after he has learned to use the term easily, he speaks it directly *at* the object. He no longer needs to keep the sound copy before him, and it lapses so completely that if we had not been with him when he learned, we should never suspect that the association between name and thing was of imitative origin. He can name the thing only because he has imitated a sound, and then by association the visual image of the thing has usurped the reaction created by this imitation. Pathological cases show that this concealment of imitative origin may go so far that patients may be able to name objects seen when they can no longer imitate the same sounds when they hear them.[1] It is as if the son of a washer-woman refuse to recognize his mother when he takes the social position of his wife, even though the wife is spending the money which the humble mother has earned.

The very great importance of this principle, apart from the question of fact, is seen in its genetic applications. It exhibits the higher mental functions as a great stride in accommodation. Memory and association do exactly the same thing for the organism, later, that perception, sensation, contractility, do earlier. Association enables us to react to facts which are distant from present facts but allied to them. Memory enables us to react to the facts of the future as if they were present, thus conserving the lessons of the past. Perception enables us to set present facts in their proper setting, and thus to react upon them with full reference to their significance. Sensation enables us to react upon facts according to their immediate worth to the organism. Contractility, exhibiting itself in 'organic imitation,' is the original form of the adaptive reaction which works through the whole precess of development.

[1] See Bastian, *Brain as Organ of Mind*, p. 623.

And with these higher reaches of accommodation, we now see, the method of it remains the same. Pleasure and pain, mixed up with the reactions of emotion, lead to the 'excess' discharge which is consolidated in the attention, and selection by attention gets its highest fruition in the explicit selective function of consciousness, volition.[1]

The actual dynamogenic parallel between simple sensation, on one hand, and memory, on the other, appears in the different classes of 'suggestions,' known as sensori-motor and ideo-motor, illustrated in detail in an earlier place. The facts of suggestion should be constantly borne in mind, since they show the transitions in behaviour between reflexes and volitions, and bridge what has often been considered a chasm of discontinuity.

§ 3. *Assimilation, Recognition*

There are several aspects of presentation and representation which seem more reasonable when brought into connection with our present topic. The principle of assimilation, made much of in recent discussions, clearly illustrates not only that a copy-image may be so strong and habitual in consciousness as to assimilate new experiences to its form and colour, but also that this assimilation is the very mode and method of the mind's digestion of what it feeds upon. Consciousness constantly tends to neglect the unfit, the *mal apropos*, the incongruous, and to show itself receptive to that which in any way conforms to its present stock. A child after learning to draw a full face — circle with spots for the two eyes, nose, and mouth, and projections on the sides for ears — will persist, when copying a face in profile, in drawing its circle, with two eyes, and two ears, and fail to see its error, al-

[1] See Chaps. XIII. and XIV. for the discussion of the Genesis of Volition and Attention.

though only one ear is visible and no eyes.[1] My child H., having been told that her shadow was herself, called all shadows 'ittle Henen' (little Helen). The external pattern is assimilated to the memory copy, or to the word or other symbol which comes to stand for it. The child has a motor reaction for imitating the latter; why should not that answer for the other as well? As everybody admits, in one way or another, such assimilation is at the bottom of recognition, and of illusions which are but mistaken recognitions.

Let us look at each of these facts — assimilation and recognition — more closely, from the genetic point of view.

In what has been said of the principle of association, we find ground for the reduction of its particular forms to the one law of *assimilation*. This matter has been ably discussed by Wundt.[2] In assimilation — and in the 'apperception' of the Herbartians — we have the general statement of all the forms, nets, modes of grouping, which old elements of mental content bring to impose upon the new. In the light of their motor effects, we are able to construe all these elements of content under the general principle of habit, and say that the assimilation of any one element to another, or the assimilation of any two or more such elements to a third, is due to the unifying of their motor discharges in the single larger discharge which stands for the apperceived result. The old discharge may itself be modified — it cannot remain exactly as it was when it stood for a less complex content. So this larger discharge represents the habit of the organism in so far as both the earlier tendencies to discharge belonging to these elements of content are represented in it; but it also represents accommodation — *i.e.* if the assimilation, appercep-

[1] Passy, *Revue Philos.*, 1891, II., p. 614.

[2] *Philos. Studien*, VII., Heft 3, pp. 345 ff. Wundt, however, confines the term 'assimilation' to "associations between the elements of like compounds" (*Outlines of Psychol.*, p. 228).

tion, synthesis, is smoothly accomplished — since it stands for a richer objective content. Presentations are associated by contiguity because they unite in a single motor discharge; by similarity, because both of them, through their association with a third, have come to unite in a common discharge. The energy of the new presentation process finds itself drawn off in the channels of the discharge of the old one which it resembles; the motor associations, therefore, and with them all the organic and revived mental elements stirred up by them, come to identify or unite the new content with the old. Among these revised elements the attention strains are of the first importance; they constitute largely the sense of activity in mental synthesis or apperception everywhere.

It is commonly held that assimilation stands midway between absolute identity of presentations, on the one hand, and such difference of presentations, on the other hand, as is found in the relative independence of associated ideas, such as, for example, the association 'stable — horse.' But this is not the true view of assimilation, for there is no such thing as absolute identity of presentation, or of mental content of any kind. Assimilation is always present. It is the necessary basis of the earliest association. For association is, as we have seen, on the organic side and at the start, only another statement for the consolidating of the different reactions which arise when the stimulations are multiple or not simple. These reactions are reduced to orderly habitual discharges — this is association by assimilation, more or less adequate to give the sense of synthesis, or unity, or identity. Association has, accordingly, a motor foundation from the first. The elements hold together in memory because they are *used together* in action. And as the action becomes one, but yet complex, so the mental content tends to become one, but yet complex also.

This becomes more evident when we call to mind that the 'objects' of the external world are very complex mental constructions. They are for the most part *made* by association. Objects have some very general aspects in common, such as colour, resistance, odour, etc. But these bare qualities, taken alone, might go to constitute one object about as well as another; and really would constitute none. What kind of an object such or such a bare stimulus shall turn out to be — this is largely a matter of association and suggestion. Hence if the mind has to construct anyhow, in each case, and to depend largely upon memory of earlier instances for its material, then it falls back at once upon those habitual reactions by which groups of associated elements are reinstated together and as one content. These old groups thus usurp the new elements by assimilation, if it be within the range of organic possibility.

Put generally, therefore, we may say that assimilation is due to the tendency of a new sensory process to be drawn off into preformed motor reactions; these preformed reactions in their turn tending to reinstate, by the principle of imitation, the old stimulations or memories which led to their preformation, with all the associations of these memories. These memories, therefore, tend to take the place of, or stand for, or include the new stimulations which are being thus assimilated.

All perception is accordingly a case of assimilation. The motor contribution to each presented object is just beginning to be recognized in cases of disease called by the general term 'apraxia,' *i.e.* loss of the sense of the use, function, utility, of objects. A knife is no longer recognized by these patients as a knife, because the patient does not know *how to use it*, or what its purpose is. The complex system of elements is still there to the eye, all together: the knife is a thing that looks, feels, etc., so and so. This is accomplished by the simple contiguous association of these elements, which have become hardened into the 'thing.' But the central link by which the object is made complete, by which, that is, these different elements were originally reproduced together by being imitated together in a single *act*, — this has fallen away. So the *apperception*, the synthesis which made the whole complex content a thing for recognition and for use, this is gone.

The great importance of this fact of assimilation becomes more evident also when we take note more in detail of the nature of the motor processes by which it takes place. When we say that a new element is assimilated to old contents by exciting the motor associates, and with them all the other entrained associates of the old, we lay ourselves open to the task of showing what the motor processes are which are thus established by habit in any particular case.

We have shown that in a developed organism the 'excess' discharge which secures accommodation, by reinstating a stimulus, takes on two great forms by the law of habit. First, we have the gross general activities of the muscles and glands, reflexes, reactions of emotion, etc., already established; and with these, second, the constant modifications of them made in getting new acquisitions of skill, etc. These represent respectively biological habit and accommodation. But then we find also the more special kind of reaction upon mental content found in attention. This has still to be described as a more or less consolidated motor reaction fixed by natural selection. We shall also see, in considering the attention, how it is that every mental content tends to call out the attention, and how, in turn, the attention modifies the content which it calls out. There is, therefore, just so far as this reaction of attention upon content is a constant generalized thing, a general demand for the assimilation of all contents in certain great nets or categories representing forms of action; and, in particular, these mental categories are due to felt movements of the attention. This may be deferred for later discussion. But this is not all of the attention. We find that there is a balance of attention process — reflex motor influence, muscular strains here and there — peculiar to each great quality of content, as being from eye, or ear, etc., and inside of this, again, a balance peculiar to each particular individual content experienced. We not only have a common attention, involving the brow-muscles, etc., but various special attentions, such as visual, auditory, etc., and further, different successive attentions for each experience of the same quality, *i.e.* let us say three successive repetitions of the same sight. If A be the gross movements of attention, a, a', a'', a''' may stand for the peculiar attentions to sight, sound, etc., and α, α', α'', α''' for the successive acts of the attention given under one of the latter, say under a.

This means that the sense of assimilation in each successive experience of the same objective content varies with the different motor shadings of attention, just as it also varies for the different sense contents or qualities by reason of the different motor strains, etc., involved in accommodating by the different senses.

Now let us see what the different cases are which will arise in successive presentation of the same external object. Let p be a new object, a peach. $A+a+\alpha$, then, by what precedes, stands for attention to it; in which A gives the sensations of gross contraction, a gives the sensations of special-sense contractions, such as rolling of the eyes, etc., and α gives the sensations of contraction peculiar to this particular object only, — say the visual exploration of its figure. Now all this works changes in the content p; as we have seen, by the law of assimilation, p gets a lot of associates attached to it by which it is brought into harmony or connection with earlier p's. It is put into the category P, the Peach.

Now suppose that instead of being an absolutely new p, this p has been seen once before and so has become p'. Then we have again the formula for attention, $A+a+\alpha'$, where α' differs from the former α. What is this difference? In consciousness I submit the difference is just this, that we *recognize* p'. Analyzed out as it has now been, we are able to see what this peculiar sense of recognition rests on. For α' differs from α in two respects: first, in the greater ease with which the movements of the eye, etc., for which α stands, are made in tracing out the figure of p' (or whatever other contractions constitute one attention different from another inside the same sense-quality — what we may call the 'motor associates' of p'), and, second, in the presence of the images belonging to the earlier experience now brought up in regular association. As to the first of these elements, it is the so-called 'subjective aspect' of recognition to be mentioned below. As to the latter element, it is evident that all the old images will be associated directly with p'. But among them will now be the image of memory left by the earlier experience of p. With this the new p' is assimilated, to such a degree that the two are not held apart at all, but the result is one object under the category P, with a group of associated elements. We say, then, that p' is recognized.

Recognition, therefore, generally involves elements of content brought together by the process of assimilation, and so rests upon attention considered as a phenomenon of motor habit, that is, upon the more habitual ingredients in the attention symbolized by the $A+a$ part of the whole attention formula. The objective presented elements are of course most evident and important. Their presence is in so far only the familiar fact of association, which seems easy to understand because it is so familiar. But association is itself a case of looser and less effective assimilation. Every two elements whatever, connected in consciousness, are so only *because they have motor effects in common.* In association they have less in common. In recognition they have so much more in common that they are presented as one, and the other elements of content associated with each of them in similar ways through common motor interests, cluster around the final outcome as the evident signs of the sameness of the new and the old. This is the fact of recognition by *Nebenvorstellungen* signalized by Wundt, under which falls Lehmann's *Benennungsassociation.* It is what may be called recognition by an *objective coefficient* (Höffding's *Bekanntheitsqualität*), or in current phrase, 'relative recognition.'

I have before gathered up this side of recognition, based both upon mental analysis and objective experiment, in a formula which holds that the sense of familiarity with an object is due to the reinstatement of the apperceptive or relational process of the earlier presentation.[1] According to this formula, taken alone, single unrelated homogeneous images such as bell-stroke, pure colour, etc., would not be recognized, single complex images such as human faces would be recognized somewhat in the degree in which the complexity had impressed itself in the first perception, and clear recognition would arise only when the relations attentively discerned were clearly brought out in the reproduced state. A further result would be that images, when reproduced, would largely depend upon and reinforce each other in producing the feeling of familiarity.

I once had an opportunity to test a little child six months

[1] *Handbook of Psychology, Senses and Intellect,* 2d ed., pp. 176–178, where the experiment given in the next paragraph is also mentioned.

and a half old, with these points in view, and the result was quite instructive. Her nurse, who had been with her continuously for five months, was absent for a period of three weeks, and on her return was instructed first to appear to the child simply in her usual dress, but to remain silent; then to withdraw from sight, but to speak as she had been accustomed to; and finally to appear and sing a nursery rhyme which by special care the little girl had not been allowed to hear during the nurse's absence. The first result was, that the child gazed in a questioning way upon the face, but showed no positive sign of a recognition; yet the absence of positive fear and antipathy shown at first toward the substitute nurse indicated that the visual image was not entirely strange. Second, the tones of the nurse's voice were not at all recognized, as far as passive indications even of familiarity were concerned, — a result we would expect from the greater purity and simplicity of the auditory images. The third experiment was attended by complete and demonstrative recognition. The visual face and auditory rhyme images must have reinforced one another, giving again the old established complex apperception of the nurse.

This case also shows, as far as any individual case can, that images from different senses vary greatly in intensity and in motor effect, especially in calling out influence upon the attention, in early child-life, that they are not well differentiated from one another, and that even at the very early age of six months special memories are becoming sufficiently permanent to fix general attitudes and habits of action in the child.

Observations are largely lacking as to what elements in the particular experiences of early childhood are most influential in recognition. Close observations of the periods when children recognize pictures of familiar objects would throw some light upon the point. E. recognized pictures of a clock and a cat early in her twelfth month, and called them 'tĭ-tĭ' (tick-tick) and 'ps-ps' (puss-puss).[1]

But it is clear that the other element in the attention-complex is also present. There is a change in the α factor itself with successive appearances of the same p content. This is not itself presented as part of the content, for it only appears in the relative ease, facility, of attention itself. It seems to attach to the subject, to the agent, to the ego who attends, not to the object or content.[2] We have in the recognition of an object not only the identification of it as objectively the same, but also a feeling of 'warmth,' ownership, self-reference. We do not recognize a thing simply *for itself;* we recognize it *for ourselves*. It has become in a sense ours by having been present to us before. This is accounted for by the fact that just this motor element it is that carries along with it the habitual attention strains, and these attention strains are in large part the stable, 'identical' element in the sense of self. So self becomes implicated in all recognition just to the extent in which the attention is easily stimulated.

Now, although we have found the objective aspect of recognition in the represented complexity of content just spoken of, — the apperceptive or associative meaning of the thing, — so it still remained to find the more uniform element of subjective reference common, in a measure, to different recog-

[1] See also the case given in Chap. XI., § 3, beginning.

[2] Ward (*Mind*, July, 1893, p. 353) has pointed out the analogy between the feeling of 'facility' which we have when we perform a movement a second or third time, and the feeling of familiarity with an object. In my view, they are exactly the same thing, except that in the former case the subjective, *i.e.* motor, sense is nearly or quite the whole of the feeling. In object recognition the objective content is still objective, but in the sense of motor facility the process of voluntary attention is identified directly with the movement, and finds in it its own appropriate outlet. The reader should also consult Ward's second article (*Mind*, October, 1894).

nitions. This I find in the *varying readiness or ease of attention* in the reinstatement of the content by assimilation to its old image and escort; that is, in the motor sensations of adjustment, which indicate in a series the varying degrees of strain or effort of the attention.

The motor associates of each sensory intensity are, therefore, looked at broadly, the $A+a+\alpha$ factors in attention, and each such reaction of the attention, when taken in a particular case, has also in it a certain degree of readiness or ease of the α factor. This has more proof in later chapters which deal with 'Attention' (Chap. XV.) and the 'Mechanism of Revival' (Chap. XIV.). When a presentation comes a second time into consciousness, it is adjusted to more easily because its apperception in attention proceeds upon a basis of ready formed association of both these kinds. The relative ease of adjustment is felt as the subjective aspect of recognition, and the consequent assimilation going on in the content itself is the objective aspect.

Cases are now well known and discussed of so-called 'absolute' recognition, in which, *i.e.*, there are no evident presented associations to mediate the recognition. The vital question is raised: How do such recognitions proceed? The two clear cases known are the recognition of simple tones, and that of simple colours. In both these cases, as is now evident, the recognition is due to the variable factor which is described above — the relative ease of attention in adjusting itself to such a tone or colour a second time.

§ 4. *Phylogenetic Value of Memory and Recognition*

It need hardly be said that memory is a function of extreme value in race development. Creatures which have in them the faculty of anticipating experiences, both pleasurable and painful, by the recall of memory pictures in something of the original setting, and which can, in consequence, anticipate the actual experiences to secure or avoid them by an adapted reaction, are most fit for natural selection. Of course they survive. This has always been seen by those writers who have found in memory a product of the organic accommodation of the creature to its environment. But a further word is necessary to point out the proper value for selection of the added fact of recognition. For a creature might well reproduce its experiences as memory pictures and react upon them well, and still not recognize them, just as pathology shows is the case in certain anæsthetic hysterics. These patients respond in writing to questions which they do not understand, or describe in writing persons whom they do not recognize. The whole group of facts of 'physiological' or organic suggestions described in the earlier pages [1] show the kind of 'organic memory' which enables the organism to act upon an experience as if it recognized it, when the actual recognition does not take place in consciousness. What is absent in these cases is, as we now know, the finer motor, synthetic, adjustments of the attention which by their variations constitute recognition.

The adaptations of most of the organisms below mammalian life, and some mammals, possibly, take place, no doubt, by such 'organic memory.' They have consciousness and also memory in the sense of 'vestiges' of past experience; but they do not recognize these images with that peculiarly 'warm' sense of ownership which we have when we greet the familiar. The attention has not grown to be the medium of a sense of self, nor has its development gone far enough to give differentiated reactions to many contents. They have what may be called *first stage* associations with

[1] Above, Chap. VI., § 2.

what they remember, *i.e.* associations of pleasure and pain, and of direct adjusted movement.

The additional fact of recognition, therefore, must have a farther value than that of simple memory. And it has, as may be readily pointed out.

By the recognition of an object a creature gets full possession of all the benefits both of immediate and of remote association, *i.e. second stage* association, let us say. Recognition follows to reinforce or inhibit the reaction of simple memory, for it is constituted by the set-back wave of motor associates already described as necessary for the assimilation of the new to the old. It means, therefore, that the creature that recognizes takes a certain *attitude*, a motor state of contraction, expansion, etc., a condition of readiness for the protective or defensive action for which the motor habits of the organism have grown to provide. But these may be different from the reactions dictated by simple memory. Recognition is a sense of *meaning* as opposed to that of bare appearance, and its reaction is often the violent checking even of the impulses due to mere organic sensibility, or to its revival. Creatures which consciously recognize, therefore, have an evident shield from the ills of the world and a mortgage upon its benefits. The dog which sees the whip only for the first time gets the flogging; but the next time he sees the whip, he recognizes it with the immediate impulse to startled attention, fear, and flight. The motor elements which underlie are, on the theory now developed, what, in his consciousness, *is*, in part, the sense of recognition. I need not add that the escape of this dog from his cruel master is the survival of the creature that is fit to survive.

Phylogenetically, the difference in value between memory and recognition is one of degree, just as the motor adjustments and the escort of associates of all kinds represented in the two cases differ only in degree of co-ordination and complexity. Memory of the organic type, without recognition, is present when there is a first-degree association between two sense areas, or between a sense and a movement area. The reaction represents a first-degree accommodation. But in recognition we have the motor organization represented by attention and complex central development in the cortex. Its reactions therefore represent all the accommodations of skill and art, and all the adjustments of will to the demands of the life of conduct.

CHAPTER XI

Conscious Imitation (continued); the Origin of Thought and Emotion

§ 1. *Conception and Thought*

Passing on to the sphere of conception and thought, we find at once an opening for the law of imitation. The principle of Identity which represents the mental demand for consistency of experience, and the mental tendency, already remarked, to the assimilation of new material to old schemes, is seen genetically in the simple fact that repetitions are pleasurable to the infant, and to us all, because of the law of habit in our reactions. Just in so far as a new experience repeats an old one, to this degree it accomplishes what direct imitation would have accomplished, and so makes easy future repetitions of it, by the reaction born of the old. This kind of accommodation by repetition we have seen to be both indicative of pleasure, and in developed organisms, also, the cause of it. So in the fact of assimilation, we have both the method of central organic development, and the platform upon which the structure of thought must be built. To say that identity is necessary to thought, therefore, is only to say that it expresses in a generalization the method of mental development by imitative reaction.

In an earlier work [1] I have depicted the progress of consciousness through the operations of reasoning — conception,

[1] *Handbook*, Vol. I., *Senses and Intellect*, Chap. XIV. See also the work *Thought and Things*, Vol. II., Chap. I., and Vol. II., Chap. II.

judgment, syllogism — in its search for identities, and I need not enlarge upon it here. The new doctrine of judgment, which goes by the name of Brentano, for the first time did justice to the demand for unity found everywhere in mental operations. Judgment always deals with *one* object, not two. So the mental demand for identity is really a *demand, i.e.* an irresistible tendency to *act in one way upon a variety of experiences.* Identity is the formal or logical expression of the principle of Habit. It is for logic, which deals with terms and copulas, what smooth assimilation and swift apperception are for psychology, which deals with elements and processes.

The principle of Sufficient Reason is subject to a corresponding genetic expression, on the side of Accommodation. Sufficient reason, in the child's mind, is a presupposition belief: anything in its experience which tends to modify the course of its habitual reactions in a way which it must accept, indorse, believe — this has its sufficient reason, and it accommodates to it. I have argued elsewhere[1] that a conflict between the established, the habitual, the taken for granted, on one hand, and the new, raw, and violent, on the other hand, is necessary to excite doubt, which is the preliminary to belief. And belief follows only when a kind of assimilation or reconciliation takes place. But this assimilation of the new, the doubtful, to the old, the established, is only done by the union of the potencies for action, in a common plan of action. Belief arises in the child in the readjustment or accommodation of himself actively to new elements of reality. Only then does he pass from 'reality-feeling,' which accompanies unimpeded habit, to belief, which comes from a new adjustment of the claims of impeded and split-up habits.

In so far as there is truth in this view, in so far does Suffi-

[1] *Handbook, Feeling and Will,* Chap. VII.

cient Reason become a formal or logical statement of the fact of Accommodation. It is for logic, again, what the more violent reconciliations, hard-bought syntheses, strains to compass all in a single 'span of consciousness,' are for psychology.

Put more broadly: whenever we believe a new thing or accept it as real, we accommodate our attitude to its presence, we make place for it in our store of acquisitions for future use; this means that we are prepared to reproduce it voluntarily and involuntarily, to make it a part of that copy system which hangs together in our memory, as representing a consistent course of conduct and the best adjustment we have been able to effect to our physical and moral environment. And on the other hand, anything which cannot get into this system is not believed; and we say we do not believe it because it lacks just in this sufficient ground or reason. The fact is, that not believing a thing simply means that we have not been able to link it up and hold it in the system of copy elements which we have established by long and patient action.

So here also imitation is the method by which our *milieu* of thought and feeling in all its aspects gets carried over and reproduced within us in a system of relationships to which we have learned to react. We live by faith, now, not by sight, because we depict truth in these relationships whose very establishing by our own action has given us the only warrant we have of their security. Our consciousness of the relationships of the elements of this reproduced world, as sustaining one another — and sustaining our trust — this is our sense of sufficient reason. Our accompanying sense of acceptance and endorsement of these copies as suited to draw out our action — this is belief; and the familiarity which repetition engenders betokens the growth of habit and the sense of identity.

Conception then arises, too, and it proceeds by identities and sufficient reasons; and we get in this connection a genetic view of the general notion. The child begins with what seems to be a 'general.' His earliest experiences, carried over into memory, become general copies which stand as assimilative nets for every new event or object. All men are 'papa,' all colours are 'wed,' all food 'mik.' Professor Cattell informs me that his little girl, after getting pain from certain *bumps* of head, etc., got to calling all bodily pain 'bump-bump.' And her little brother further generalized the term to apply to all mental discomforts, such as disagreeable emotions, fears, etc. What this really means is, that the child's motor outlets are fewer than his receptive experiences. Each experience of man, *e.g.*, calls out the same attitude, the same incipient movement, the same sort of attention, on his part, as that with which he hails 'papa.' In other words, each man is a repetition of the papa copy, and carries the child out in action, just as his own early response to the presence of the real papa carried him out. But of course this does not continue. By his learning new accommodations, by his having experiences which will not assimilate, this dominancy of habit is, in part, counteracted; his classes grow more numerous as his reactions do, his general notions become more 'reasonable,' and he is on the proper way to a 'rectification of the concept.'

The ordinary question of the rise of the 'concept' from the 'percept' may, accordingly, get its answer in this view; and it is well to go a little more into details. It is only partially true that the concept arises from the percept at all. It is rather true that the two arise together, by the same mental movement, which is apperception or motor synthesis. Going back again to that neglected period, infancy, we may ask, as a matter of fact, what takes place.

Suppose, after the very common method of the day, a single presentation, A, in the infant consciousness; then suppose it removed. The child is now ready to germinate in two different ways, forward and backward, future-ward and past-ward. He remembers and he expects. Viewed as *memory*, his experience, A, is particular, a sensation, after a time a percept. But it includes more than his simple receptive state. He reacts to it, and so stands ready to react to it again. This readiness is his *expectation*, — the tendency he has to a definite reaction; and as the only one, it stands ready to 'go off' on any kind of stimulus which is locally near enough to discharge that way. His memory then becomes *schematic*[1] of the future. Viewed as expectation, it is the whole of the child's reality; it is what will happen, for it is all that can happen; he knows nothing else. Whatever then actually does happen is at first reacted to as A, and remains A, by this active confirmation, if it is possible for the child's consciousness to keep it A. This meaning that past experience, taken as representing future experience, is 'schematic'[1] I may call the *concept of the first degree.* It means that at this stage particular experiences are the measure of all things, of things undefined; since they are all that the organism is accommodated to, and they are the copies to which all experiences are assimilated if possible. The child is under the reign of habit or identity.

But as particulars increase, they limit one another, both in memory and in expectation. In expectation, because they are brought only partially under common tendencies of discharge in action; in memory, because by this tendency to partial disunion in action they are subject to the great processes of assimilation, association, and inhibition. Instead of A (red colour) happening, B (green colour) happens; and instead of

[1] The word '*Schema*' for such a meaning is suggested in the work *Thought and Things*, Chap. VIII., §§ 6 ff.

all my reds being red squares, and all my greens, green squares, I have red circles and green circles, red and green triangles, fantastic shapes of red and green, etc. This means two things in the growth of concepts: first, that my expectation is no longer of all reds, *i.e.* my red is no longer a concept of the first degree. It cannot, by passing off through a single motor discharge, stand for all colours. Green is in part refractory. So red is now a particular as compared with green. And, second, my expectation is no longer that all my reds will be square, for the same reason as before. There will be circular, triangular, irregular reds. But with it all they are equally red. In this respect they do assimilate, and my red is now *general* as compared with particular instances of red. Now this particularizing of experiences in reference to one another is the function of perception, and this generalizing of experience, with reference to its single instances, is conception, which gives *the general, a concept of the second degree.* So conception and perception arise together.

At the same time, experience takes on another psychological aspect. New experience not only adds new items opposed to old items, but it leads to revision of the old — all through the law of assimilation by means of motor reaction. What passed for greens turn out to be partly blues; they accordingly require and secure a modified action; so in my expectation of greens, I may no longer accept blues. So also I leave out the demand that my greens be either square, or circular, or triangular, *i.e.* I leave out figure. This means that in my more generalized motor reaction to colour, I leave out the more special eye explorations which contribute the *figure-value* to the complex content. Or, to give a more concrete example, first, boat is boat with spread sails, three masts, and sailors in the rigging; then sailors are dropped, sails and masts go, etc. What is left is ordinarily said to be *abstracted*, as, for instance, the concept colour, a quality abstracted from particular instances. But true abstraction is not a singling out; it is rather a paring down, a wearing off, an erosion, due to the progress in adjustment which the organism has been able to effect under the law of the reduction of motor habits by compounding.[1] Thus is reached a *concept of the third degree*. It represents that which is essential in an experience, not only as tested by its uninterrupted recurrence amid shifting and drifting details, but more especially by its regular calling-out force upon me in some great fixed way of acting.

How experience gets collected, related, distinguished, in this way, is ordinarily the question of the function of consciousness itself. I prefer to call the process considered thus as mental function, apperception, and to say that both the percept and the concept arise by the apperceptive function of consciousness, to which a genetic construction is given in the earlier pages. They become, on this view, simply different aspects of one thing — a synthesis of elements. Looked at backward, the product is an event, a particular, a percept, a concept; looked at forward, it is 'schematic' of other events still to be determined by action.

We are now able, in summing up, to make out two important points for psychology, I think. First, we see that this so-called apperception is genetically the simple fact of motor habit, with the assimilations and associations which it gives rise to. Motor habit is the great devouring thing which throws its arms around all mental details and unifies them in its embrace. The most refined and subtile form of it takes place higher in attention. Attention is the vehicle of

[1] See above, Chap. VIII., § 4. For a later development of the logical side of the 'general,' the work *Thought and Things*, Vol. I., Chaps. VIII., X., may be consulted.

apperception; as psychologists now agree it supplies the 'form' to every 'content.' To say this, however, is only to say that attention, representing as it does the most refined and most central forms of motor reaction upon revived mental content — that its adjustments are the medium of conception, thought, reasoning, of all possible groupings and arrangings in the mind. Thought, therefore, exhibits a new stage in motor accommodation. It shows the organism's adjustments to the relationships of truth, as memory, perception, sensation, show its adjustments to those of fact. The mechanism of voluntary attention, by which this selection or adjustment proceeds, is described in a later chapter.

The second thing which may now be said, is that this view shows why we have never been able to find a mental picture or content for a 'general notion.' Attempts at this culminated but did not terminate with Hume. It is evident that the 'general' or 'abstract' is not a content at all. It is an attitude, an expectation, a motor tendency. It is the possibility of a *reaction* which will answer equally for a great many particular experiences. As far as there are the particular images which Hume pointed out, and such processes of composition as those made much of by Waitz — these are both true statements of partial aspects of the broader fact of assimilation which has been given general treatment in the exposition above.[1]

[1] I may note the agreement intimated in the following quotations from a *Syllabus of Lectures* by Professor Royce: "All general ideas are the mental aspects of habits of response in presence of those general characters of things to which the ideas in question relate. Without motor habits, no ideas;" "consciously general ideas are the mental aspects of deliberately formed habits of response to the general characters of things; and for that very reason are modifiable in definite ways, and are, accordingly, more or less successfully adjustable to decidedly novel conditions. Of such deliberate habits of response the processes of language are a familiar example." "These attributes of Deliberateness and Modifiability are in general due to the Influence

§ 2. *Conception as Class-recognition*

From what has been said of the formation of the general notion, its relation to recognition becomes interesting. This point has never been made clear, I think, on any of the old theories. How is it that a single object is recognized as belonging to the class which is covered by a general concept? It is evident that this presents a different phase of recognition from that which comes to view in the recognition of a single object as the same single object. Calling this further kind of recognition 'class-recognition,' we find it now possible to suggest an explanation of it.

We found convenient, it will be remembered, a certain formula in speaking of the elements involved in attention; the formula $A+a+\alpha$. A represents the fixed, habitual, always-present strains, stresses, organic movings, etc., involved in every act of attention. This element involves the stable elements of the sense of self, and so carries self-recognition or sense of personal identity with it. This is the extreme case of recognition on the habit side. The third element, α, further has already been seen to give us, in its changes from one to another experience of the same object or content, the sense of recognition at the other extreme, the accommodation extreme, the absolute recognitions from

of the Imitative Function. For imitation, although founded on instinct, implies for its development Deliberateness and Plasticity of adjustment. Rational General Ideas are therefore, on the whole, products of imitation, are the mental aspects of imitative motor habits of response to the socially recognized general aspects of things."

The true 'general,' however, is a meaning of established habit; a retrospective meaning, in contrast with the 'schematic' or prospective meaning which is one of accommodation to new cases as yet not tested nor assimilated. The distinction is worked out in the treatise on genetic logic (*Thought and Things*, Vol. I.).

which objective complexity may be largely absent. Now, in the middle, in the *a* element, we find the very common fact of class-recognition accounted for, in the main. The formation of class notions we have seen to be by union, coalescence, of motor processes, with assimilations of new elements of content to old habitual schemes. Now the attention is directly implicated in all these class formations. Indeed, it is by the training of attention in this way that the most stable class divisions are formed, *i.e.* those which mark off the great quality-types of mental processes. One's attention is visual, or auditive, or motor, as it gets habitually exercised with one or other of the senses.[1] So the elements, in an act of attention, which arise from the contractions peculiar to one kind of content, remaining relatively constant for all instances of that kind of content, give us the recognition-coefficient for that class. I recognize a visual picture as something I have *seen*, because it stirs up that *a* element of attention which consists in the motor revivals, reverberations, etc., of the eyebrow, frown-muscles, scalp shiftings, etc., peculiar to visual attention. Auditory class-recognition proceeds, similarly, upon revived auditory attention-strains, etc. So we have in the *a* element in the attention formula sufficient explanation of class-recognition, and of its position midway between recognition of self and recognition of single objects, *qua* single. Of course, as Wundt says, just in so far as a single object is recognized as complex, and by reason of its complexity, just so far it tends to become a case of class-recognition; inasmuch as the relationships inside of which its assimilation proceeds are common nets for a possibly varied filling.

The three recognition phenomena, therefore, which this scheme sets in order are, self-identity (*A*), the great ground-

[1] This is taken up in some detail in the chapter on Attention (Chap. XV.).

swell of organic habit, and mental sameness; class-recognition (a), covering the wide objective side, the contents subject to assimilation in classes; and absolute recognition (α), the refined adjustments in which present functional elements are paramount. The motor formula for attention, then, adds up these three elements, all of which are facts of attention, giving $Att. = A + a + \alpha$.

§ 3. *Emotion and Sentiment* [1]

Again, in the affective life we find evidence of the working of the imitative principle. Emotion we have seen to be, largely, in its qualitative marks, a revival product, a clustering, so to speak, of organic and muscular reverberations about revived elements of content. So the production of emotion depends upon the reinstatement, by association or action, of parts of the ideal copy system which it is the function of memory and association to build up and to preserve. This follows from what we have said in two earlier discussions, that on the nature of emotion, and that on the organic basis of memory and association.

There is, however, one class of emotions which show more clearly the fact that the framework of ideas to which emotion attaches is really a product of imitation; these are the sympathetic emotions. Sympathy may be called the imitative emotion *par excellence*. My child H. cried out when I pinched a bottle-cork in her fifth month, and wept in her twenty-second week at the sight of a picture of a man sitting

[1] The balance of this chapter, and the next (Chap. XII.), give *en résumé* positions which are developed as topics of independent and practical value in the volume, *Social and Ethical Interpretations*. They are given here under the general head of imitation, in order to make passably complete the applications of the imitative principle; in this way also the treatment of the other volume is rendered somewhat less theoretical.

weeping, with bowed head in his hands, and his feet held fast in stocks.[1] In such cases the presentation is assimilated to memory copies of personal suffering, and so calls out the motor attitudes of the emotions habitual to experiences of pleasure- or pain-giving objects. And the motor discharges, each time that they are repeated, become better defined and more telling upon consciousness.

In many cases, however, I think the associative order in the sympathetic emotions is the reverse of this. The sight of the expression of emotion in another stimulates similar attitudes directly in us, and this in turn is felt as the state which usually accompanies such a reaction. The two cases of sympathy in my child, given above, illustrate the truth of both these accounts.

The sympathetic emotion, in fact, shows the 'circular' form of reaction. The pain-suggesting presentation is itself the copy which tends to bring about appropriate attitudes in the person having it. And all emotion has the same origin as this. The 'expression' of fear, for example, is a reinstatement of motor and organic disturbances which were, first of all, utility reactions upon a stimulation. But all utility reactions upon a stimulation are simply those elements, in a larger diffused 'excess' discharge, which were selected just because they were fitted to maintain or avoid, as the case may be, a particular kind of stimulation. So just in so far as the position is valid that all adapted movements are illustrations of the fundamental vital adaptations represented by reaching-out and drawing-in movements, just so far all the revivals of them, which break into consciousness as emotion, are imitative in their origin.

[1] This is, I own, a remarkably early recognition of a pictorial rendering of expression; but I have the date recorded. The picture will be found on page 227 of Bissell's *Biblical Antiquities*. Darwin reported 'sympathy' in his child, six months and eleven days old, *Mind*, II., p. 289.

There are, further, two or three special illustrations of this function of imitation in the genesis of emotion so clear *in the making*, in children, that I shall briefly trace them. First let us consider the sense of self, with its remarkable group of emotions.

I have described in an earlier place the kind of responses which infants make in the presence of persons, and the main facts may be here recalled. We have seen that one of the most striking tendencies of the very young child in its responses to its environment is the tendency to recognize differences of personality. It responds to what I have called 'suggestions of personality.' As early as the second month, it distinguishes its mother's or nurse's touch in the dark. It learns characteristic methods of holding, taking up, patting, kissing, etc., and adapts itself, by a marvellous accuracy of protestation or acquiescence, to these personal variations. Its associations of personality come to be of such importance that for a long time its happiness or misery depends upon the presence of certain kinds of 'personality-suggestion.' It is quite a different thing from the child's behaviour towards things which are not persons. Things get to be, with some few exceptions which are involved in the direct gratification of appetite, more and more unimportant; things get subordinated to regular treatment or reaction. But persons become constantly more important, as uncertain and dominating agents of pleasure and pain. The fact of movement by persons and its effects on the infant seem to be the most important factor in this peculiar influence; later the voice gets to stand for a person's presence, and at last the face and its expressions equal the person, in all his attributes.

I think this distinction between persons and things, between agencies and objects, is the child's very first step toward a sense of the qualities which distinguish persons.

The sense of uncertainty or lack of confidence grows stronger and stronger in its dealings with persons — an uncertainty contingent upon the moods, emotions, *nuances* of expression, and shades of treatment, of the persons around it. A person stands for a group of experiences quite unstable in its prophetic as it is in its historical meaning. This we may, for brevity of expression, assuming it to be first in order of development, call the '*projective* stage'[1] in the growth of the personal consciousness, which is so important an element in social emotion.

Further observation of children shows that the instrument of transition from such a 'projective' to a subjective sense of personality, is the child's active bodily self, and the method of it is the principle of imitation. As a matter of fact, accommodation by actual muscular imitation does not arise in most children until about the seventh month, so utterly organic is the child before this, and so great is the impetus of its congenital instincts and tendencies. But when the organism is ripe, by reason of cerebral development, for the enlargement of its active range by new accommodations, then he begins to be dissatisfied with 'projects,' with contemplation, and so starts on his career of imitation. And of course he imitates persons. Persons have become, by all his business with them and theirs with him, his interesting objects, the source of his weal or woe, his uncertain factors. And further, persons are bodies which move, and among these bodies which move, which have certain projective attributes, as already described, a very peculiar and interesting one is his own body. It has connected with it certain intimate features which all others lack. Besides the inspection of hand and foot,

[1] See the detailed observations and analysis of these 'personal projects,' above, Chap. VI., §§ 3, 6. The use of the word 'project' is justified in the earlier connection.

by touch and sight, he has experiences in his consciousness which are in all cases connected with this body, —strains, stresses, resistances, pains, etc., — an inner felt series matching the outer presented series. But it is only when a new kind of experience arises which we call effort — a set opposition to strain, stress, resistance, pain, an experience which arises, I think, first as imitative effort — that there comes that great line of cleavage in his experience which indicates the rise of volition, and which separates off the series now first really *subjective*. Persistent imitation with effort is the typical case of explicit volition, and the first germinating nucleus of self-hood over against object-hood. Situations before accepted simply, are now set forward, aimed at, wrought; and in the fact of aiming, working, the fact of agency, which we have found to arise with the child's realization of the possible capriciousness of character, is the nascent sense of subject.[1]

The subject sense, then, is an actuating sense. What has formerly been 'projective' now becomes 'subjective.' The associates of other personal bodies, the attributes which made them different from things, are now attached to his own body with the further peculiarity of actuation. This we may call the *subjective* stage in the growth of the self-notion. It rapidly assimilates to itself all the other elements by which the child's own body differs in his experience from other active bodies, — the passive inner series of pains, pleasures, strains, etc. The self suffers as well as acts. All get set over against lifeless things, and against other bodies which act, indeed, but whose

[1] It is in exhibition of this new sense of agency, or power over its own actions, *with their suggestiveness to others*, that the child's first conscious 'lies' seem to appear; and these lies are generally of great value as being the means of bringing out, in its earliest forms, the originality and invention of the boy or girl. Cases are given in the chapter on 'Invention' in *Social and Ethical Interpretations*.

actions do not contribute to his own sense of actuation or of suffering.

Again, it is easy to see what now happens. The child's subject sense goes out by a kind of return dialectic, which is really simply a second case of assimilation, to illuminate these other persons. The project of the earlier period is now lighted up, claimed, clothed on with the raiment of self-hood, by analogy with the subjective. The projective becomes *ejective;* that is, other people's bodies, says the child to himself, have experiences *in them* such as mine has. They are also *me's:* let them be assimilated to my *me* copy. This is the third stage; the *ejective,* or 'social' self, is born.[1]

The *ego* and the *alter* are thus born together. Both are crude and unreflective, largely organic, an aggregate of sensations, prime among which are efforts, pushes, strains, physical pleasures and pains. And the two get purified and clarified together by this twofold reaction between project and subject, and between subject and eject. My sense of myself grows by imitation of you, and my sense of yourself grows in terms of my sense of myself. Both *ego* and *alter* are thus essentially social; each is a *socius*, and each is an imitative creation. So for a long time the child's sense of self includes too much. The circumference of the notion is too wide. It includes the infant's mother, and little brother, and nurse, in a literal sense; for they are what he thinks of and aims to act like, by imitating, when he thinks of himself. To be separated from his mother is to lose a part of himself, as much so as to be separated from a hand or foot. And he is dependent for his growth directly upon these sugges-

[1] I think an adequate apprehension of the distinctions conveyed by the three words 'projective,' 'subjective,' and 'ejective,' would do much to banish the popular 'psychologist's fallacy.'

tions which come in for imitation from his personal *milieu*.[1]

It will be seen by readers of R. Avenarius,[2] that the two stages of this development correspond to the two stages in his process of *Introjection*, whereby the 'hypothetical' (personal-organic) element of the *naturlichen Weltbegriff* is secured. Avenarius finds, from analytical and anthropological points of view, a process of 'attribution,' reading-in (*Einlegung*), by which a consciousness comes to interpret certain peculiarities attaching to those items in its experience which represent organisms and afterwards persons. The second stage is that whereby these peculiarities get carried back and attached to its own organism (*Selbsteinlegung*), and recognized as 'subjective' (sensations, perceptions, thoughts), in both organisms, over against the regular 'objective' elements contained in the rest of the world experience.

This general doctrine of Avenarius finds better justification than he gives it, I think, from the genetic sphere, into which he does not go. The two phenomena, 'personality-suggestion' and 'imitation,' supply just the support for a revised doctrine of 'Introjection.' First comes what I have called, in what precedes, the 'projective' stage of the self-notion. It is the stage in which the infant gets 'personality-suggestions.' It is simply the infant's way of getting 'more copy' of a peculiar kind from the personal element in its objective surroundings. The second stage is secured by imita-

[1] Professor Josiah Royce has expressed, in an article in the *Philosophical Review*, November, 1894, a view of the growth of the self-notion in the child's consciousness in close agreement, in many points, with this; and I take pleasure in referring to his development as similar to the detailed statement of my other volume. My present text appeared, in much the same words as now, in *Mind* for January, 1894. Royce's paper is now to be found in his volume, *Studies in Good and Evil*.

[2] *Kritik der reinen Erfahrung*, and also *Der menschliche Weltbegriff*.

tion. The child reproduces the copy thus obtained, consisting of the physical signs, and, through them, of the mental accompaniments. Here the imitation of emotional expressions has its great influence. By this reproduction it 'interprets' its projects as subjective, in itself, and then refers them back to the 'other person' again, with all the gain of this interpretation. Avenarius, as far as I have been able to discover, has no means of passing from the first to the second stage, from *project* to *subject*. He speaks [1] of a certain confusion (*Verwechselung*) of the projective experience (*T-Erfahrung*) with the remaining personal elements in consciousness (*M-Erfahrung*): but what the true leading-thread into this 'confusion' and out of it is, he does not note. This is just what I claim it is the function of imitation to do; it supplies the bridge with two reaches. It enables me — the child — to pass from my experience of what you are, to an interpretation of what I am; and then from this fuller sense of what I am, back to a fuller knowledge of what you are.[2]

[1] *Der menschliche Weltbegriff*, § 51, p. 30, and § 95, p. 49.

[2] In the use of the two facts, 'personality-suggestion' and 'imitation,' therefore, my development is unindebted to Avenarius, who writes from the point of view of race history and criticism. I do not adopt the word 'introjection,' since it covers too much. My word 'project' signifies the child's sense of others' personality before it has a sense of its own. The rest proceeds by imitation. This distinction of method raises a further question which, as I have already said (Chap. I.), should be carefully discussed in all problems for which a genetic solution is sought, *i.e.* how far the genetic process itself in the individual's growth has become a matter of race habit or instinct. That is, granted a process of origin correctly depicted, to what extent must we say that each new individual of the race passes through it in all its details? The origin of impulse and instinct illustrate the effects of selection in abbreviating these processes and starting the individual from points of higher vantage. I am not prepared to say that an isolated child, for example, might not get a crude self-notion (as he might learn to speak somehow) if deprived of all social suggestions; but that fact would be subject to explanation as part of the ability to learn which is the outcome, on a large scale, of the very genetic process which it appears to supersede.

Further, this process of taking in elements from the social world by imitation and giving them out again by a reverse process of invention (for such the sequel proves invention to be: the modified way in which I put things together in reading the elements which I get from nature and other men, back into nature and other men again) — this process never stops. We never outgrow imitation, nor our social obligation to it. Our sense of self is constantly growing richer and fuller as we understand others better, — as we get into social co-operation with them, — and our understanding of them is in turn enriched by the additions which our own private experience makes to the lessons which we learn from them. These and other aspects of social emotion, which come to mind in connection with this suggestive topic, are reserved.[1]

I think some light falls on the growth of ethical feeling, also, from the psychology of imitation, although I must again disclaim adequacy of treatment. The two principles, habit and imitative accommodation, seem to get application on this higher plane: the plane which is the theatre of the rise of moral sentiment. Moral sentiment arises evidently around acts and attitudes of will. It is accordingly to be expected that the account of the genesis of volition will throw some light upon the conditions of the rise of conscience. So if it be true that present character is the deposit of all former reactions of whatever kind, and that what we call will is a general term for our concrete acts of volition, and further that volition represents a co-ordination of tendencies, then according as these tendencies are suggestions from other persons, on the one hand, and represent partial expressions of one's own personal character, on the other hand, there arises a division within that sense of voluntary agency which is the germ of the notion of self. Your suggestion to me may con-

[1] See, however, Chap. XII. Cf. the later work.

flict with my desire; my desire may conflict with my own present sympathy. Self meets self, so to speak. The self of accommodation, imitation, the self that learns, collides with the self of habit, of character, the self that seeks to dominate. It is no longer a matter of simple habit *versus* simple suggestion, as is the case in infancy, before the self gets the degree of complexity which constitutes it a voluntary agent, as a later chapter shows. It is now that form of habit which is personal agency, coming into conflict with that form of suggestion which is also personal to me as representing my social self. Your example is powerful to me intrinsically; not because it is abstractly good or evil, but because it represents a part of myself, inasmuch as I have become what I am in part through my sympathy with you and imitation of you. So your injunctions to me bring out a difference of motor attitude between what is socially responsive in me, in a sense public, and that which is relatively me alone, my private self.

When I come to a new moral situation, therefore, my state is this, in each case — and we shall see as we go on that it is yet more: I am in a condition of relative equilibrium, or balance of two factors, my personal or habitual self, and my social suggestive self. Your wife announces to you that you are to go to a reception given by Mr. A. 'Hang Mr. A!' is your first reply — that of your habitual private self. But your wife says, "Some one of the family should be there, and besides I want to go." This is an appeal to your family, public, social self in its broad sense, supplemented by an appeal to your sympathetic, narrower, conjugal self. The new decision which you make tends to destroy this equilibrium by reinforcing your 'copy' and its influence in your character, on one side or the other, and so to lead you out for further habit or for new social adaptations.

And now on this basis comes a new mental movement which seems to me to involve a further development of the imitative *motif* — a development which substitutes warmth and life for the horrible coldness and death of that view which identifies voluntary morality with submission to a 'word of command.' The child, it is true, very soon comes across that most impressive thing in its moral environment which we call authority; and acquires that most responsive thing in our moral equipment which we call obedience. He acquires obedience in one of two ways, or both: by suggestion, or by reward and punishment. The way of suggestion is the higher; because it proceeds by gradual lessons in accommodation, until the habit of regularity in conduct is acquired, in opposition to the capriciousness of his own reactions. It is also the better way because it sets before the child in an object lesson an example of that stability and lawfulness which it is the end of obedience to foster. Yet the way of punishment is good and necessary. Punishment is nature's way; she inflicts the punishment first, and afterwards nurses the insight by which the punishment comes to be understood. A child's capricious movement may bring a pain which represents all the organic growth of the race; and so when we punish a child's capricious conduct, we are letting fall upon him the pain which represents all the social and ethical growth of the race. But by whatever method, — suggestion or punishment, — the object is the same: to preserve the child, until he learns from his own habit the insight which is necessary to his own salvation through intelligent submission.

But whether obedience comes by suggestion or by punishment, it has this genetic value: it leads to another refinement in the sense of self, at first 'projective,' then subjective. The child finds himself stimulated constantly to deny his impulses, his desires, even his irregular sympathies, by conforming to the will of another. This other represents a regular, systematic, unflinching, but reasonable personality — still a person, but a very different person from the child's own. In the analysis of 'personality suggestion,' we found this stage of the child's apprehension of persons — his sense of the regularity of personal character in the midst of the capriciousness that before this stood out in contrast to the regularity of mechanical movement in things. There are extremes of indulgence, the child learns, which even the grandmother does not permit; there are extremes of severity from which even the cruel father draws back. Here, in this dawning sense of the larger limits which set barriers to personal freedom, is the 'copy' forming, which is his personal authority or law. It is 'projective,' because he cannot understand it, cannot anticipate it, cannot find it in himself. And it is only by imitation that he is to reproduce it, and so arrive at a knowledge of what he is to understand it to be. So it is a 'copy for imitation.' It is its aim, — so may the child say to himself, — and should be mine, — if I am awake to it, — to have me obey it, act like it, think like it, be like it in all respects. It is not I, but I am to become it. Here is my ideal self, my final pattern, my 'ought' set before me. My parents and teachers are good because, with all their differences from one another, they yet seem to be alike in their acquiescence to this law. Only in so far as I get into the habit of being and doing like them in reference to it, get my character moulded into conformity with it, only so far am I good, And so, like all other imitative functions, it teaches its lesson only by stimulating to action. I must succeed in doing — he finds out, as he grows older and begins to reflect upon right and wrong — if I would understand. But as I thus progress in doing, I forever find new patterns set for me; and so my ethical insight must always find its profoundest expression in that yearning which anticipates, but does not overtake, the ideal.[1]

My sense of moral ideal, therefore, is my sense of a possible perfect, regular will, taken over *in me*, in which the personal and the social self — my habits and my social calls — are brought completely into harmony; the sense of obligation in me, in each case, is a sense of lack of harmony — a sense of the actual discrepancies between my various concrete thoughts of self. To pursue my commonplace illustration, your wife adds to the reasons for your attending the reception of Mr. A., this one: 'And besides, you ought to go out more.' This is the profoundest reason of all; not because it has in it the word 'ought,' merely, but because it makes appeal to the ideal self, before the law of which all the earlier claims have their lesser or greater value.

And then, once more, the thought of this ideal self, made ejective, as it must be by the dialectic of this germinating social sense, put out of and beyond me — this is embodied in the moral sanctions of society, and finally in God.[2]

[1] A further important aid to the child in this development is his observation of the way that other people *behave to one another* in his presence.

On the nature of 'ideals' and the rise of conceptual emotion, in which, in my view, the sense of ideals, *as being ideal*, really consists, see my *Handbook of Psychology*, Vol. II., Chap. IX., carried further in *Thought and Things*, Vol. I., Chap. X., § 8.

[2] I can only mention here Hegel's striking treatment of the genetic development of the ethical and religious sense (*Philosophy of Mind*, § II.), altogether the best ever written, in my opinion, and Adam Smith's remarkable doctrine of the social element in the moral sense, covered by the term 'sympathy' (in *Theory of the Moral Sentiments*). Many facts give support to Hegel's intuitions. On the distinctively social function of imitation, Tarde and Sighele both dwell in the works named, the latter endeavouring to lay the foundations of a science of 'collective psychology.' A similar task is set in my later volume. As to religious emotion, it is astonishing enough that the law of imitation should reach so far as to touch those mysterious 'ideas

The value of the ejective sense of moral self is seen in the great sensitiveness we have to the supposed opinions of others about our conduct. It is an essential and constant ingredient. From the account given of the rise of the sense of obligation, we should expect the two very subtle aspects of this sensitiveness which are actually present. First, in general, our dread and fear before another's fancied opinion is in direct proportion to our own sense of self-condemnation. Consciousness is clear on this point. It must be so if it is true that our sense of self-condemnation is of social origin, *i.e.* arises from our imitative response to the well-sanctioned opinions and commands of others. But second, the intelligent observation of the opinions of others, and the suffering of the penalties of social law, react back constantly to purify and elevate the standard which one sets himself, just as they originally stimulated its rise. There is, therefore, a constant progress through the action and reaction of society upon the individual and the individual upon society. And religious sanctions get much of their force, it seems to me, in just this same way.

Josiah Royce[1] distinguishes between the two earlier phases of self which have been pointed out, but does not develop the third. Yet he indicates clearly and with emphasis the twofold element of conflict under which the moral sense develops. The ordinary accounts on the natural history side, from Darwin[2] to the present, simply describe a conflict in consciousness between sympathy and selfishness. This fails to do justice to the 'law' element, which moralists justly emphasize, in the genesis of morality. It gives no standard

of reason' which have so long baffled metaphysics. But — why should it not? Is not the cry 'Anthropomorphism!' as old as Xenophanes? And is it not a plea for or against imitation?

[1] *International Journal of Ethics*, July, 1893, p. 430.

[2] *Descent of Man*, Part I., Chap. III.

of values, no scale for the estimation of the worths of the impulses which represent temporary and changing selves. I should go farther than Royce does in emphasizing this element, believing as I do that there is no full sense of oughtness until the child gets the basis of a *habit*, which not only calls upon him to deny his private selfishness in favour of sympathy, but also his private sympathies in favour of reasonable regularity learned through submission. The opposition, that is, between my regular personal ideal and all else, — whether it be the regularity of my selfish habit or the irregularity of my generous responses, — this is the essential condition of the rise of obligation. And it is in so far as this ought-feeling goes out beyond the copy elements drawn from actual instances of action, and anticipates better or more ideal action, that the antithesis between the 'ought' and the 'is' gets psychological justification.

The question, finally, whether obedience is a case of imitation,[1] is a matter of words. It is imitation, in the large sense of the term. As far as the copy set in the 'word of command' is reproduced, the reaction is imitative. A child cannot obey a command to do what he does not know how to do. The circumstances of his doing it, however, the forcible presentation of the copy by another person, this seems only to add additional elements to the copy itself, not to be in any sense an interference, or a prevention of the due operation of imitation. The child has in view, when he obeys, not only the thing he is to do, but the circumstances — the consequences, the punishment, the reward — and these also he seeks to reproduce or to avoid. On the other hand, it may well be asked whether all of our voluntary imitations and actions generally, are not, in a sense, cases of obedience; for

[1] See discussion by Tarde, *loc. cit.*, and Paulhan, *Revue Philosophique*, August, 1890, p. 179; also Tönnies, *Philosophische Monatshefte*, 1893, p. 308.

it is only when an idea gets some suggestive force, or sanctions, or social setting, that it is influential in bringing us out for its reproduction. Of course this is only further play on definitions; but it serves to indicate the real elements in the situation. When Tönnies says that obedience comes first and imitation afterwards, he refers to voluntary imitation of a particular action which the child has already learned to do. But the whole theory of his learning must go before, and it could hardly be said that the child learned to do a thing at first simply by being commanded to do it.

CHAPTER XII

Conscious Imitation (concluded)

§ 1. *Classification*

It is possible, on the basis of the preceding developments, to lay out a scheme of notions and terms to govern the discussion of the whole matter of imitation. This has been the 'loose joint' in many discussions; the utter lack of any well-defined limits set to the phenomena in question. Tarde practically claims all cases of organic or social resemblance as instances of imitation, overlooking the truth, as one of his critics takes pains to point out, that two things which resemble each other may be common effects of the same cause! Others are disposed to consider the voluntary imitation of an action as the only legitimate case of imitation. This, we have seen, has given rise to great confusion among psychologists. We have reason to think that volition requires a finely complex system of copy elements, whose very presence can be accounted for only on the basis of earlier organic, or certainly ideo-motor, imitations. Further, it is the lower, less volitional types of mind that simple imitation characterizes, the undeveloped child, the parrot, the idiot, the hypnotic, the hysterical. If again we say, with yet others, that imitation always involves a presentation or image of the situation or object imitated, — a position very near the popular use of the term, — then we have great difficulty in accounting for the absorption and reproduction of subconscious, vaguely present stimulations; as, for example, the acquisition of facial expression, the contagion of emotion, the growth of style in dress and institutions — what may be called the influence of the 'psychic atmosphere.'

I think we have found reason from the analysis above, to hold that our provisional definition of imitation is just; an imitative reaction is one which tends normally to maintain or repeat its own stimulating process. This is what we find the nervous and muscular mechanism suited to, and this is what we find the organism doing in a progressive way in all the types of function which we have passed in review. If this is too broad a definition, then what we have traced must be given some other name, and imitation applied to any more restricted function that can be clearly and finally marked out. But let us give no rein to the fanciful and strained analogies which have exercised the minds of certain writers on imitation.

Adhering, then, to the definition which makes of imitation a 'circular' process, we may point out its various 'kinds,' according to the degree in which a reaction of the general type has, by complication, abbreviation, substitution, inhibition, or what not, departed in the development of consciousness from its typical simplicity. We find, in fact, three great instances of function, all of which conform to the imitative type. Two of these have already been put in evidence in detail; the third I am going on to characterize briefly in the following section under the phrase 'plastic imitation.'

First: the organic reaction which tends to maintain, repeat, reproduce, its own stimulation, be it simple contractility, muscular contraction, or selected reactions which have become habitual. This may be called *biological* or *organic imitation.* Under this head fall all cases lower down than the conscious picturing of copies; lower down in the sense of not involving, and never having involved, for their execution, a conscious sensory or intellectual suggesting stimulus, with the possibility of its revival as a memory. On the nervous side, such imitations may be called *subcortical;* and in view of another class mentioned below, they may be further qualified as *primarily subcortical.*

These 'biological' imitations are evidently first in order of development, and represent the gains or accommodations of the organism made independently of the conscious picturing of stimulations and adaptation to them. They serve for the accumulation of material for conscious and voluntary actions. In the young of the animals, their scope is very limited, because of the complete instinctive equipment which young animals bring into the world; but in human infants they play an important part, as the means of the gradual reduction to order and utility of the diffused motor discharges of the new-born. I have noted its presence under the phrase 'physiological' suggestion [1] in another place. It is under this head that the so-called 'selective' function of the nervous system finds its first illustration.

Second: we pass to *psychological*, *conscious*, or *cortical* imitations. The criterion of imitation — the presence of a copy to be aimed at — is here fulfilled in the form of conscious presentations and images. The copy becomes consciously available in two ways: first, as presentation, which the imitative reaction seeks to continue or reproduce (as the imitation of words heard, movements seen, etc.); and second, as memory. In this latter case there arises complexity in the 'copy system,' with desire, in which there is consciousness of the imitative tendency as respects an agreeable memory copy; and with the persistence of such a copy, and its partial repression by other elements of memory, comes

[1] Above, Chap. VI., § 2.

volition. We find, accordingly, two kinds of psychological or cortical imitation, which I have called respectively 'simple' and 'persistent' imitation. Simple imitation is the sensori-motor or ideo-motor suggestion which tends to keep itself going by reinstating its own stimulation; and persistent imitation is the 'try-try-again,' experience of early volition, to be taken up in more detail below.[1]

Third: a great class of facts which we may well designate by the term 'plastic' or 'secondarily subcortical' imitations, to which more particular attention may now be given.

§ 2. *Plastic Imitation*

This phrase is used to cover all the cases of reaction or attitude, toward the doings, customs, opinions of others, which once represented more or less conscious adaptations either in race or in personal history, but which have become what is ordinarily called 'secondary automatic' and subconscious. With them are all the less well-defined kinds of response which we make to the actions, suggestions, etc., of others, simply from the habit we are in, by heredity and experience, or conforming to social 'copy.' Plastic imitation represents the general fact of that normal *suggestibility* which is, as regards personal *rapport*, the very soul of our social relationships with one another.

These cases come up for detailed discussion in the later volume. They serve to put in evidence the foundation facts of a possible psychology of masses, crowds, organized bodies generally. They may be readily explained by one or both of two principles — both really one, that of Habit. The principle of 'lapsed links,' already explained, applies to cases of conventional conformity, or custom, which is but an

[1] Cf. Chap. XIII.

expression for abbreviated processes of social imitation. This accounts for the influence of the old, the venerated, the antique, upon mankind. The other principle is the application of habit itself to imitation, whereby absorption by imitation has become the great means, the first resort of consciousness, in the presence of new kinds of experience. We have become used to getting new accommodations, fine outlets for action and avenues of happiness, by taking up new thoughts, beliefs, fashions, etc. This accounts for the tyranny of novelty in all social affairs. So in these two principles, both exhibitions of the one law of imitation, we reach the two great forces of social life, conservatism and liberalism. So we find under this heading such fundamental facts as the social phenomena of contagion, fashion, mob-law, which Tarde and Sighele so well emphasize, the imitation of facial and emotional expression, moral influence, organic sympathy, personal *rapport*, etc., all matters set aside for later treatment. The term 'plastic' serves to point out the rather helpless condition of the person who imitates, and so interprets in his own action the more intangible influences of his estate in life.

The general character of plastic imitation may be made clearer if we give attention to some of its more obscure instances, and assign them places in the general scheme of development.

The social instances noticed at length by Tarde, and summarized under so-called 'laws,' are easily reduced to the more general principles now stated. Tarde enunciated a law based on the fact that people imitate one another in thoughts and opinions before they do so in dress and customs, his inference being that 'imitation proceeds from the internal to the external.' So far as this is true it is only partially imitation. Thoughts and opinions are imitated because they are most important, and most difficult to maintain for oneself. And it is only a result of similar thought that action should be similar, without in all cases resorting to imitation to account for this last similarity. But the so-called facts are not true. The relatively trivial and external things are most liable to be seized upon. A child imitates persons, and what he copies most largely are the personal points of evidence, so to speak; the boldest, most external manifestations, the things that he with his capacity is most likely to see, not the inner essential mental things. It is only as he grows to make a conscious distinction between thought and action that he gets to giving the former a higher valuation. And so it is in the different strata of society. The relative force of convention, imitation of externals, worship of custom, seems to have an inverse relation to the degree of development of a people.

Again, Tarde's laws relative to *imitation mode* and *imitation coutume* — the former having in its eye the new, fashionable, popular, the fad; the latter, the old, venerable, customary — are so clearly partial statements of the principles of accommodation and habit, as they get application in the broader genetic ways already briefly pointed out, that it is not necessary to dwell further upon them.[1]

The phenomena of hypnotism illustrate most strikingly the reality of this kind of imitation at a certain stage of mental life. Delbœuf makes it probable[2] that the characteristic peculiarities of the 'stages' of the Paris school are due to this influence; and the wider question may well be opened, whether suggestion generally, as understood in hypnotic

[1] Tarde's other principle, that 'inferiors imitate superiors,' is clearly a corollary from the view that the progressive sense of personality arises through social suggestion.

[2] *Revue Philosophique*, XXII., pp. 146 ff.

work, might not be better expressed by some formula which recognizes the fundamental sameness of all reactions — normal, pathological, hypnotic, degenerative — which exhibit the form of stimulus-repeating or 'circular' process characteristic of simple imitation. In normal, personal, and social suggestion the copy elements are, in part, unrecognized; and their reactions are subject to inhibition and blocking-off by the various voluntary and complicated tendencies which have the floor. In sleep, on the other hand, the copy elements are largely spontaneous images, thrown up by the play of association, or stimulated by outside trivialities, and all so weak that while action follows in the dream persons, it does not generally follow in the dreamer's own muscles. But in hypnotic somnambulism, the copy elements are from the outside, thrown in; the inner fountains are blocked; action tends to follow upon idea, whatever it is. Even the idea of no action is acted out by the lethargic, and the idea of fixed self-sustaining action by the cataleptic.[1]

Further, in certain cases of madness (*folie à deux*, etc.) the patient responds to the copy which has been learned from a single person only, and which has aided in the production of the disease.[2] In all these cases, the peculiar character of which is the performance, under conditions commonly called those of aboulia,[3] of reactions which require the muscular

[1] It may be well to quote Janet's summary of his determinations of the characteristic features of general catalepsy, all of which indicate a purely imitative condition of consciousness, *Aut. Psych.*, p. 55: "The different phenomena which we have described are these; *i.e.* the continuation of an attitude or a movement, the repetition of movements which have been seen and of sounds which have been heard, the harmonious association of the members and of their movements." Cf. Janet on hysteria, *Arch. de Neurologie*, June, July, 1893.

[2] Cf. Falret, *Études cliniques sur les maladies mentales et nerveuses*, p. 547.

[3] This would involve, as I have intimated on an earlier page, a doctrine which holds that in the hypnotic state, there is inhibition of the cortical asso-

co-ordinations usually employed by voluntary action, we have illustrations of 'plastic' imitation. On the pathological side, we find, in aphasic patients who cannot write or speak spontaneously, but who still can copy handwriting and speak after another, cases which illustrate the same kind of defect, yet in which the defect is not general, but rather confined to a particular group of reactions, by reason of a circumscribed lesion.

In this form of imitative suggestion, it is now clear, we have a second kind of subcortical reaction. It is 'secondarily subcortical,' in contrast with the organic or 'primarily subcortical' imitations. When looked at from the point of view of race history, it gives us further reason for finding in imitation a native impulse.[1]

§ 3. *How to Observe Children's Imitations*[2]

There are one or two considerations of such practical importance to all those who wish to observe cases of imitation by children, that I venture to throw them together, only

ciative or synthetic function, but not of the simple cortical sense function. Cf. Gurney's remarks on Heidenhain's explanation of 'hypnotic mimicry,' in *Mind*, 1884, p. 493.

[1] In the earlier publication of some of the positions of this chapter (*Mind*, January, 1894, p. 52), I argued against Bain's view, in his *Senses and Intellect*, pp. 413 ff. (3d ed.), of imitation as in all cases acquired. In his fourth edition, while repeating his former arguments, he nevertheless so weakens them by a supplementary note that I find his concessions practically bringing him into accord with our own views. The note is as follows (*loc. cit.*, p. 441): "As in other connections, I have to qualify the foregoing explanation by admitting the possibility and the fact of hereditary transmission in at least preparing the way or giving facilities for the operation now described. . . . The inheritance of tendencies favouring acquisition may decisively contribute to the advancement of our early powers of imitation. The term 'instinct' would thus have a certain fitness. . . ."

[2] See the *Century Magazine* for December, 1894, and cf. Royce's article on 'The Imitative Functions' in the same magazine for May, 1894.

saying by way of introduction that they all follow from the general statement that nothing less than the growth of personality is at stake in the method and matter of its imitations; for the 'self' is largely the form or process in which the personal influences surrounding the child take on their new individuality.

1. No observations are of much importance which are not accompanied by a detailed statement of the personal influences which have affected the child. This is the more important since the child sees few persons, and sees them constantly. It is not only likely — it is inevitable — that he *make up his personality*, under limitations of heredity, by imitation, out of the 'copy' set in the actions, temper, emotions, of the persons who build around him the social enclosure of his childhood. It is only necessary to watch a two-year-old closely to see what members of the family are giving him his personal 'copy' — to find out whether he sees his mother constantly and his father seldom; whether he plays much with other children, and what their dispositions are, to a degree; whether he is growing to be a person of subjugation, equality, or tyranny; whether he is assimilating the elements of some low unorganized social content from his foreign nurse. For, to use Leibnitz's term, the boy or girl is a social 'monad,' a little world, which reflects the whole system of influences coming to stir its sensibility. And just in so far as his sensibilities are stirred, he imitates, and forms habits of imitating; and habits? — they are character!

2. A point akin to the first is this: every observation should describe with great accuracy the child's relation to other children. Has he brothers or sisters; how many of each, and of what age? Does he sleep in the same bed or room with them? Do they play much with one another alone? The reason is very evident. An only child has only

adult 'copy.' He cannot interpret his father's actions, or his mother's, oftentimes. He imitates very blindly. He lacks the more childish example of a brother or sister near himself in age. And this difference is of very great importance to his development. He lacks the stimulus, for example, of games, in which personification is a direct tutor to self-hood, as is taught elsewhere.[1] And while he becomes precocious in some lines of instruction, he fails in wealth of imagination, in variety of fancy. The dramatic, in his sense of social situations, is largely hidden. It is a very great mistake to isolate children. One alone is perhaps the worse, but two alone are subject to the other element of social danger which I may mention next.

3. Observers should report with especial care all cases of unusually close relationship between children in youth, such as childish favouritism, 'platonic friendships,' 'chumming,' in school or home, etc. We have in these facts — and there is a very great variety of them — an exaggeration of the social or imitative tendency, a narrowing down of the personal suggestive sensibility to a peculiar line of well-formed influences. It has been little studied by writers either on the genesis of social emotion or on the practice of education. To be sure, teachers are alive to the pros and cons of allowing children and students to room together; but it is with a view to the possibility of direct immoral or unwholesome contagion. This danger is certainly real; but we, as psychological observers, and above all as teachers and leaders, of our children, must go even deeper than that. Consider, for example, the possible influence of a school chum and room-mate upon a girl in her teens; for this is only an evident case of what all children thus isolated are subject to. A sensitive nature, a girl whose very life is a branch of a social

[1] See *Thought and Things*, Vol. I., Chap. VI., §§ 6 ff.

tree, is placed in a new environment, to engraft upon the members of her mutilated self — her very personality; it is nothing less than that — utterly new channels of supply. The only safety possible, the only way to conserve the lessons of her past, apart from the veriest chance, and to add to the structure of her present character, lies in securing for her the greatest possible variety of social influences. Instead of this, she meets, eats, walks, talks, lies down at night, and rises in the morning, with one other person, a 'copy' set before her, as immature in all likelihood as herself, or, if not so, yet a single personality, put there to wrap around her growing self the confining cords of unassimilated and foreign habit. Above all things, fathers, mothers, teachers, elders, give the children room! They need all that they can get, and their personalities will grow to fill it. Give them plenty of companions, fill their lives with variety, — variety is the soul of originality, and its only source of supply. The ethical life itself, the boy's, the girl's, conscience, is born in the stress of the conflicts of suggestion, born right out of his imitative hesitations; and just this is the analogy which he must assimilate and depend upon in his own conflicts for self-control and social continence. So impressively true is this from the human point of view, that in my opinion — formed, it is true, from the very few data accessible on such points, still a positive opinion — children should never be allowed, after infancy, to room regularly together; special friendships of a close exclusive kind should be discouraged or broken up, except when under the immediate eye of the wise parent or guardian; and even when allowed, these relationships should, in all cases, be used to entrain the sympathetic and moral sentiments into a wider field of social exercise.

4. The remainder of this section must be devoted to the further emphasis of the need of close observation of chil-

dren's games, especially those which may be best described as 'society games.' All those who have given even casual observation to the doings of the nursery have been impressed with the extraordinary fertility of the child mind, from the second year onward, in imagining and plotting social and dramatic situations. It has not been so evident, however, to these casual observers, nor to many really more skilled, that they were observing in these fancy-plays the putting together anew of fragments, or larger pieces, of their own mental history. But here, in these games, we see the actual use which our children make of the personal 'copy' material which they have got from you and me. If a man study these games patiently in his own children, and analyze them out, he gradually sees emerge from the child's inner consciousness its picture of the boy's own father, whom he aspires to be like, and whose actions he seeks to generalize and apply anew. The picture is poor, for the child takes only what he is sensible to. And it does seem often, as Sighele pathetically notices on a large social scale, and as the Westminster divines have urged without due sense of the pathetic and home-coming point of it, that he takes more of the bad in us for reproduction than of the good. But be this as it may, what we give him is all he gets. Heredity does not stop with birth; it is then only beginning. And the pity of it is that this element of heredity, this reproduction of the fathers in the children, which might be used to redeem the new-forming personality from the heritage of past commonness or impurity, is simply left to take its course for the further establishing and confirmation of it. Was there ever a group of school children who did not leave the real school to make a play school, erecting a throne for one of their number to sit on and 'take off' the teacher? Was there ever a child who did not play 'church,' and force her father if possible into the pulpit? Were there ever children who did not 'buy' things from fancied stalls in every corner of the nursery, when they had once seen an elder drive a trade in the market? The point is this: the child's personality grows; growth is always by action; he clothes upon himself the scenes of his life and acts them out; so he grows in what he is, what he understands, and what he is able to perform.

In order to be of direct service to observers of games of this character, I shall now give a short account of an observation of the kind made a few weeks ago — one of the simplest of many actual situations which my two little girls, Helen and Elizabeth, have acted out together. It is a very commonplace case, a game, the elements of which are evident in their origin; but I choose this rather than one more complex, since observers are usually not psychologists, and they find the elementary the more instructive.

On May 2, I was sitting on the porch alone with the children — the two mentioned above, aged respectively four and a half and two and a half years. Helen, the elder, told Elizabeth that she was her little baby; that is, Helen became 'mama,' and Elizabeth 'baby.' The younger responded by calling her sister 'mama,' and the play began.

"You have been asleep, baby. Now it is time to get up," said mama. Baby rose from the floor, — first falling down in order to rise, — was seized upon by 'mama,' taken to the railing to an imaginary wash-stand, and her face washed by rubbing. Her articles of clothing were then named in imagination, and put on, one by one, in the most detailed and interesting fashion. During all this 'mama' kept up a stream of baby talk to her infant: "Now your stockings, my darling; now your skirt, sweetness — or, no — not yet — your shoes first," etc., etc. Baby acceded to all the details with more than the docility which real infants usually show. When this was done, "Now we must go tell papa good-morning, dearie," said mama. "Yes, mama," came the reply; and hand in hand they started to find papa. I, the spectator, carefully read my newspaper, thinking, however, that the reality of papa, seeing that he was so much in evidence, would break in upon the imagined situation. But not so. Mama led her baby directly past me to the end of the piazza, to a column in the corner. "There's papa," said mama; "now tell him good-morning." — "Good-morning, papa; I am very well," said baby, bowing low to the column. "That's good," said mama, in a *gruff, low voice*, which caused in the real papa a thrill of amused self-consciousness most difficult to contain. "Now you must have your breakfast," said mama. The seat of a chair was made a breakfast-table, the baby's feigned bib put on, and her porridge carefully administered, with all the manner of the nurse who usually directs their breakfast. "Now" (after the meal, which suddenly became dinner instead of breakfast), "you must take your nap," said mama. "No, mama; I don't want to," said baby. "But you must." — "No; you be baby, and take the nap." — "But all the other children have gone to sleep, dearest, *and the doctor says you must*," said mama. This convinced baby, and she lay down on the floor. "But I haven't undressed you." So then came all the detail of undressing; and mama carefully covered her up on the floor with a light shawl, saying, "Spring is coming now; that'll be enough. Now shut your eyes, and go to sleep." — "But you haven't kissed me, mama," said the little one. "Oh, of course, my darling!" — so a long siege of kissing! Then baby closed her eyes very tight, while mama went on tiptoe away to the end of the porch. "Don't go away, mama," said baby. "No; mama wouldn't leave her darling," came the reply.

So this went on. The nap over, a walk was proposed, hats put on, etc., the mama exercising great care and solicitude for her baby. One further incident to show this: when the baby's hat was put on — the real hat — mama tied the strings rather tight. "Oh! you hurt, mama," said baby. "No; mama wouldn't draw the strings too tight. Let mama kiss it. There, is that better, my darling?" — all comically true to a certain sweet maternal tenderness that I had no difficulty in tracing.

Now in such a case, what is to be reported, of course, is the facts. Yet knowledge of more than the facts is necessary, as I have said above, in order to get the full psychological lesson. We need just the information which concerns the rest of the family, and the social influences of the children's lives. I recognized at once every phrase which the children used in this play, where they got it, what it meant in its original context, and how far its meaning had been modified in this process which I have called 'social heredity.' But as that story is reported to strangers who have no knowledge of the children's social antecedents, how much beyond the mere facts of imitation and personification do they get from it? And how much the more is this true when we examine those complex games of the nursery which show the brilliant fancy for situation and drama of the wide-awake four-year-old?

Yet we psychologists are free to interpret; and how rich the lessons even from such a simple scene as this! As for Helen, what could be a more direct lesson — a lived-out exercise in sympathy, in altruistic self-denial, in the healthy elevation of her sense of self to the dignity of kindly offices, in the sense of responsibility and agency, in the stimulus to original effort and the designing of means to ends — and all of it with the best sense of the objectivity which is quite lost in wretched self-consciousness in us adults, when we personate other characters? What could further all this highest mental growth better than the game by which the lessons of her mother's daily life are read into the child's little self? And then, in the case of Elizabeth, certain things appear. She obeys without command or sanction, she takes in from her sister the elements of personal suggestion in their simpler childish forms; and certainly such scenes, repeated every day with such variation of detail, must give something of the sense of variety and social equality which real life afterwards confirms and proceeds upon; and lessons of the opposite character are learned by the same process.

And all this exercise of fancy must strengthen the imaginative faculty. The prolonged situations, maintained sometimes whole days, or possibly weeks, give strength to the imagination and train the attention. And I think, also, that the sense of essential reality, and its distinction from the unreal, the merely imagined, is helped by this sort of symbolic representation. But it has its dangers also — very serious ones. And possibly the best service of observation just now is to gather the facts with a view to the proper recognition and avoidance of the dangers.

Finally, I may be allowed a word to interested parents. You can be of no use whatever to psychologists — to say nothing of the actual damage you may be to the children — unless you *know your babies through and through.* Especially the fathers! They are willing to study everything else. They know every corner of the house familiarly, and what is done in it, *except the nursery.* A man labours for his children ten hours a day, gets his life insured for their support after his death, and yet he lets their mental growth, the formation of their characters, the evolution of their personality, go on by absorption — if no worse — from common, vulgar, imported and changing, often immoral, attendants! Plato said the state should train the children; and added that the wisest man should rule the state. This is to say that the wisest man should tend his children! Hugo gives us, in Jean Valjean and Cosette, a picture of the true paternal relationship. We hear a certain group of studies called the *humanities*, and it is right. But the best school in the humanities for every man is in his own house.[1]

[1] In the detailed treatment of 'genetic logic' in *Thought and Things*, Vol. I., Chap. VI., the make-believe or 'semblant' mode of construction is found to be an essential stage in the development of knowledge.

CHAPTER XIII

The Origin of Volition

§ 1. *Description and Analysis of Volition*

In earlier chapters I have endeavoured to trace the development of some aspects of the child's active life up to the rise of volition. The transition from the involuntary class of muscular reactions to which the general word 'suggestion' applies, to the performance of actions foreseen and intended, occurs, as has been intimated, through the persistence and repetition of imitative suggestions. The distinction between simple imitation and persistent imitation has been made and illustrated in an earlier place.[1] Now, in saying that volition — the clearly conscious phenomenon of will — arises historically on the basis of persistent imitation, what I mean is this: that *the normal child's first exhibition of volition is found in its repeated efforts to imitate something; and what it imitates, its 'copy,' is of two great kinds:* (1) *something external, such as movements seen and noises heard; and* (2) *something internal, arising in its own memory, imagination, or thought.* I shall consider, first, the rise of volition by imitation of external copies, — since this comes first in natural history, or phylogenesis, — and then consider the modifications which are necessary when we come to consider memory and imagination as setting copies for imitation to the individual child.

An adequate analysis of will, with reference to the fiat of

[1] Above, Chap. VI., § 4.

volition, reveals three great factors for which a theory of the origin of this function should provide. These three elements of the voluntary process are desire, deliberation, and effort. Desire is distinguished from impulse by its intellectual quality, *i.e.* by the fact that it always has reference to a presentation or pictured object. This distinguishes desire from that formidable and refractory thing which is called 'restlessness.' Organic impulses may pass into desires, when their objects become conscious. Further, desire implies lack of satisfaction of the impulse on which it rests — a degree of inhibition, thwarting, unfulfilment. Put more generally, these two characteristics of desire are: (1) a pictured object suggesting associated experiences which it does not suffice to realize, and (2) an incipient motor reaction which the imaged object stimulates but does not discharge.[1] Analysis shows, I think, that these two points are equally important, because correlative. Without associated experiences, the object would give rise only to simple ideo-motor suggestion, as in the cases already cited, and in hypnotic suggestion; but these associated experiences lack body, satisfying quality, the 'reality coefficient.' In Pauline phrase, 'What a man hath why doth he yet hope for?' But the mere picturing of objects with their associates, of whatever kind, does not constitute desire. Desire is a tendency-state, an incipient action, a condition of high potential, which, however, does not discharge itself. For example, — to take an illustration from our main subject, the infant, — the child continues to cry for an apple which his nurse refuses to give him; the nurse's prohibition has not the requisite inhibitive force to obliterate the motor tensions aroused by the pictured fruit and its associated pleasures. But the child's father comes into the room,

[1] See my *Handbook of Psychology*, II., Chap. XIV., § 2 (pp. 324 ff.), for the general analysis of desire.

and says, 'No!' Forthwith the child gives it up, satisfies himself with other objects, and no longer shows the motor tendencies and expressions which indicate desire. Yet in this latter case, the object-picture and its suggested pleasures are still present just the same. Real desire is gone, I think, as completely as in the hypnotic trance, when a new command turns the patient's motor responses into new channels. I do not desire the millions of my neighbour, nor a seat in the House of Lords; my sense that such things are unattainable inhibits all active attitude. But, for the opposite reason, I do desire an increase in my salary, and a seat on the bench where competent psychologists hold counsel together.

These prerequisites of desire allowed, it becomes relatively easy to fix the rise of the phenomenon in the infant's growth. Evidently, memory must be well developed, and the clear defining of a mental picture, that it may be an appropriate nucleus to a particular desire. This defining, it is further evident, must be sought, first, in connection with the senses whose so-called 'presentative' element is earliest and most pronounced. Sight and sound memories fulfil this requirement first; they are most clear-cut and uncomplicated with other sense pictures. Further, muscular memories are among the earliest with which they become associated, some such connections being possibly congenital. And the necessary associations of pleasure, which powerfully impel to desire, are pungent and strong in the case of muscular sensations.

I think it is in connection with sight and hearing memories of pleasant experiences, accordingly, as they are associated with pleasurable or not very painful movements, that desire is to be first looked for normally. Of auditory memories, the voice of mother or nurse, and sounds associated with the preparation of food, etc., become evident stimulations to lively anticipatory reactions which express desire. On the side of vision, again, similar indications are abundant, and extend back yet earlier in the infant's mental history.

The theory which connects desire fundamentally with appetite and thirst for pleasure can be defended, I think, only when supplemented from the side of simple ideo-motor suggestion. It is clear that appetite is at first organic, purely sensational; it has no objective terminus.[1] And it is only as appetites get tied to some well-defined visual or auditory memory picture, that the unrest of hunger and thirst becomes the desire for food and drink. But all desires are not thus founded in appetite, nor aimed at pleasure. It is only going a step farther, therefore, in the recognition of the essentials of the state called desire in normal and typical cases, to say, as I have said elsewhere,[2] that "desire takes its rise in visual (or auditory) suggestion, and develops under its lead."[3]

As a matter of fact, it seems to me to be extremely likely that the first cases of real desire in the infant's consciousness find their expression in the movements of its hands toward or from objects which it sees. We have seen that hand-movements are the natural outlets for clear differences in consciousness. As soon as there is clear visual presentation of objects we find impulsive muscular reactions directed toward them, at first in an excessively crude fashion, but becoming rapidly refined. These movements are free and uninhibited — simple sensori-motor suggestive reactions. But we have seen, in the experiments described above, that this vain and random grasping, which prevailed up to about the sixth month, tended to disappear rapidly in the two subsequent months — just about the time of the rise of imitation. During the

[1] The cries and other movements which are associated with appetite are largely organic pain reflexes.

[2] *Handbook*, II., p. 324.

[3] Of course with blind or deaf children other senses supply the suggestions.

eighth month, my child, H., would not grasp at highly-coloured objects more than sixteen inches distant, her reaching distance being ten to twelve inches. This training of impulse is evidently an association of muscular sensations from the arm with visual experiences of distance. The suggested reaction becomes inhibited in a growing degree by counteracting nervous processes which probably began their influence much earlier. Here are the conditions necessary to the rise of desire. It is a typical instance, at any rate, whether or not it be,[1] as I think, the first instance, of the *full fact* of desire.

The further requisite to volition, as analysis gives it, is 'deliberation.' The phenomenon called 'deliberative suggestion' has already been described and illustrated from child-life.[1] The line of cleavage between such suggestion and the deliberation of volition lies, I think, just where that between impulse and desire lies. The characteristic thing about desire is the advanced representative process it involves — the third-level process on the brain side — with the complex sensori-motor system which is the basis of various inhibitions. So in deliberation, the complexity actually present in deliberative suggestion passes up to a higher level. The elements of it became clearly pictured, co-ordinated in the attention, and estimated, as to relative suitableness for execution. It is a vivid, clear thing in consciousness, this deliberation, both as to the elements of representation and as to the

[1] Of course, like all other dividing lines in consciousness, such a line of division is not well marked. It is impossible to say just how far the dumb, unpictured, organic ends in cases of appetite, unrest, muscular discomfort, etc., must crystallize into outline and objective reference to be no longer impulse, but desire. The needs of our terminology rather than the mental facts themselves lead to such divisions. Sight and sound act first only because and when they are first as memory objects; if they are absent, then less clear mental pictures get to be desired, of course.

[1] Above, Chap. VI., § 3.

motor tendencies which they represent. On the contrary, the child's mind, in 'deliberative suggestion,' is analogous to the state of conflicting impulse, motor jerkiness, unreasonable caprice, seen also in certain pathological subjects, who are victims of *aboulia* in any of its forms. The essential difference — and it is essential, I think, functionally considered — is that the deliberation of volition involves attention at its normal gait, and the motor co-ordinations which are characteristic of it and of its seat among the highest brain relationships. Now the resolution of this conscious complexity of motives, as found in deliberation, gives another and the culminating characteristic of volition *i.e.* effort.

Effort, in all its forms, from simple consent, acceptance, ratification, of an action as good or as real, to the violent exertion of despair, or passion, — effort arises just after deliberation, and puts an end to it. We need not go into the vexed question of the meaning of effort, its basis, etc.; all we need here is its natural history. And everybody will admit that it puts an end to mental hesitation and deliberation, it settles things so far as one's attitude is concerned, and issues in action so far as inhibiting conditions will permit. The sense of effort, then, seems to accompany, or indeed *to be*, the passage of consciousness into a state of motor monoïdeism, or strong attention, after the perplexities of deliberation. It arises just when an end is put to motor plurality by synthesis or co-ordination.[1]

§ 2. *The Typical Case of the Rise of Volition in the Child*

These three characters of volition — desire, attentive deliberation, effort — find their typical fulfilment, I think,

[1] Cf. the full treatment of the appropriate chapters of James, *Princ. of Psychol.*, II., Chap. XXVI., and Baldwin, *Handbook of Psychology*, Vol. II., especially Chap. XV., § 1, and Chap. XVI., § 1.

in the 'try-try-again' experience of infants; and the evident case of this, seen in the persistent imitation of sounds heard and movements seen, the 'external copies' spoken of above, may be now considered.

We have seen that sight and hearing, in direct association with muscular sensation, supply the materials for reproduction largely at this early period; and it has now been urged that we are to look to imitation, considered as a type of reaction, as the principal method of adjustment of the organism to its surroundings. Independently, however, of this last presumption,—indeed, in my own mental progress it was the facts of early volition that led me to the broader view of imitation in mental development,—the direct evidence on the point is quite convincing.

Persistent Imitation and Volition. — In persistent imitation we have an advance on simple imitation in two ways: (1) A comparison of the first result produced by the child (movement, sound) with the suggesting image or 'copy' imitated. This is nascent deliberation. For, when the dynamogenic influences of these presentations are taken into account, we find a conflict on the motor side. The old hand-movement, let us say, associated with the 'copy,' as it has been established by simple imitation, instinct, or impulse, does not adequately represent the influence now exerted by the 'copy,' plus that of the new optical picture created by the reaction itself. The dynamogenic condition is now complex. This gives rise to the state of dissatisfaction, motor restlessness, which is desire, best described in this connection by the phrase 'will-stimulus'; (2) the outburst of this complex motor condition in a new reaction, accompanied in consciousness by the attainment of a monoideistic state — the 'end in view'—and the feeling of effort. Here, then, in persistent imitation we have, thus briefly put, the necessary elements of the voluntary psychosis for the first time clearly present.

The reason that in imitation the material for volition is found is seen to be that here the 'circular process,' already described, maintains itself in a conscious way through the picturing of sights, sounds, etc. In reactions which are not consciously imitative, for example an ordinary pain-movement reaction, this circular process, whereby the result of the first movement becomes itself a stimulus to the second, etc., is not brought about; or, if it do arise, it consists simply in a repetition of the same motor event fixed by association — as the repetition of the *ma* sound so common with very young infants. Consciousness remains monoïdeistic. But in persistent imitation, the reaction performed comes in by eye or ear as a new and different stimulus (see Fig. XIII.); here

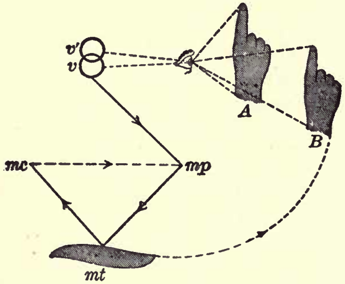


FIG. XIII. — SIMPLE IMITATION. *v*, *v'* = VISUAL SEAT; *mp* = MOTOR SEAT; *mt* = MUSCLE MOVED; *mc* = MUSCLE-SENSE SEAT; *A* = 'COPY' IMITATED; *B* = IMITATION MADE. THE TWO PROCESSES *v* AND *v'* FLOW TOGETHER IN THE OLD CHANNEL *v*, *mp*, FIXED BY ASSOCIATION, AND THE REACTION IS REPEATED WITHOUT CHANGE OR EFFORT.

is the state of motor polyïdeism necessary for the rise of the feeling of effort. The motor process must be reduced by coordination to a reaction which will reproduce the copy, and at the same time employ, with least modification, the channels of discharge already fixed by the association between presentation and movement.

From this and the other lines of evidence given below, we are able to see more clearly the conditions under which effort arises. It seems clear that (1) the muscular sensations arising from a suggestive reaction do not present all the conditions; in young children, just as in habitual adult performances, muscular sensations simply tend to give a repetition of the muscular event by strict association, without any new attentive co-ordination at all. There is no new adaptation, and so no effort. The kinæsthetic centre empties into a lower motor centre in some such way as that described by James,[1] along the diagonal line *mc*, *mp* in the 'motor square' diagram given above (Fig. XIII.). This is also true when (2) sensations of the 'remote' kinæsthetic order, the sight or hearing of movements made, are added to the muscular sensations. They may all coalesce to produce again a repetition of the original reaction. The 'remote' and 'immediate' sources of motor stimulation reinforce each other. This is seen in a child's satisfied repetition of its own mistakes in speaking and drawing, although it hears and sees its own performances. Consequently (3) there is muscular effort only when the 'copy' persists and is compared with the result of the first reaction; that is, on the mental side, when the two presentations are held together in the attention, so that together they represent one intended movement or mental end; and on the physical side, when the two processes, started respectively by the 'copy' and the reactive result, are co-ordinated together in a common motor discharge (*cc*, *mp'* in Fig. XIV.). The stimulus to repeated effort arises from the lack of this co-ordination or identity in the motor influences of the dif-

[1] *Princ. of Psychology*, II., p. 582.

ferent stimulations which reach a possible centre of co-ordination simultaneously; or if we consider such co-ordination only functionally — instead of making it a matter of a separate local seat — this will-stimulus represents the degree of difficulty these stimulations have in getting thus united in a common motor function.[1] The mental outcome, effort, ac-

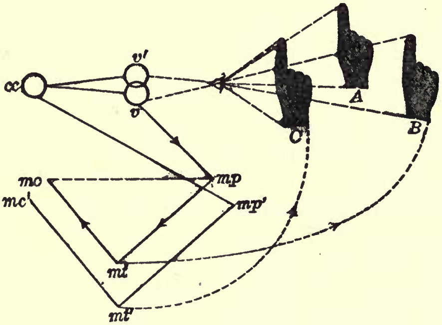


FIG. XIV. — PERSISTENT IMITATION WITH EFFORT. *C* = SUCCESSFUL IMITATION; *cc* = CO-ORDINATING CENTRE, EITHER LOCAL OR PURELY FUNCTIONAL. OTHER LETTERS SAME AS IN FIG. XIII., WITH THE ADDED CIRCUIT *cc*, *mp'*, *mt'*, *mc'*. THE PROCESSES AT *v* AND *v'* DO NOT FLOW TOGETHER IN THE OLD CHANNEL *v*, *mp*, BUT ARE CO-ORDINATED AT *cc* IN A NEW REACTION *mp'*, *mt'*, WHICH INCLUDES ALL THE ELEMENTS OF THE 'COPY' (*A*) AND MORE. THE USELESS ELEMENTS THEN FALL AWAY BECAUSE THEY ARE USELESS AND THE SUCCESSFUL EFFORT IS ESTABLISHED.

companies the gathering of these combined influences, and, as soon as this outburst reproduces the 'copy,' the effort is said

[1] This does not necessarily imply a central *versus* peripheral theory of the *sense* of effort; for the 'relative difficulty' spoken of in effecting the co-ordination in the attention may itself represent peripheral elements which inhibit the attention, or lack of the necessary peripheral elements to stimulate the attention, or the very feeling of effort may be made up of sensations from the muscles which are used in the act of attention. See Chap. XV., §§ 1 ff.

to 'succeed,' the subject is satisfied, 'will-stimulus' disappears, and the reaction tends to become simple as habit.

Physiologically the point which distinguishes persistent imitation with effort from simple imitation with repetition is this co-ordination of motor processes. In simple imitation the excitement aroused by the reaction, as its result is reported inwards by the eye or ear, finds no outlet except that already utilized in the earlier suggestive reactions. Hence it passes off in the way of a repetition of the earlier discharge, which represents inherited tendency, reflex movement, accidental association, pleasure-pain acquisition, or what not. All this is an affair of the 'second level,' of suggestion, of reactive consciousness. The child repeats its prattle over and over, as it lies abed in the early morning, simply from vigour, not from desire, nor from effort, least of all with deliberation. The sounds he makes are accompanied by sensations in his vocal organs, and what he hears he makes again, and so on, simply because his machinery works that way — works easily and gives him the pleasure of exercise and rhythm.

But persistent imitation — how different! The same reaction is not repeated. He is no longer delighted with his simple activity. He detects differences between what he sees or hears and what he produces by hand or tongue,[1] and grows restless under these differences. Then he makes effort to reduce the difference by altering his movements, and what is

[1] "It seems just to say," remarks Janet (*Autom. Psych.*, p. 475), "that voluntary effort consists in the systematization of images and memories which are accustomed to express themselves one at a time automatically"; and (p. 474), "the patient copies the movement of my arm automatically, while I copy a drawing voluntarily; the reason of it is that the patient acts only because he has an image of the action, and he carries it out without passing judgment upon it [simple imitative suggestion], while I copy the drawing, perceiving the resemblance, and because I perceive it" [persistent imitation or volition]. Compare his context.

most remarkable, he succeeds in doing so. How he does this, — how he brings about a change in his reactions, from senseless repetition to intelligent conformity to the copy which he imitates, — that is the question of accommodation, but he does it, and the least that this can mean is that there is in some way a modification of the impelling influence of his old associations.

What happens is an 'effort,' and by this effort the two stimulations, the original 'copy' and his own reproduction of it, are combined in one motor response. The two centres, or partial centres, stimulated by the original copy, on the one hand, and by the reaction as it is seen or heard, on the other hand, get combined in a common action, whose outcome is not carried off entirely by the old associated channel of discharge, but finds in part new adjacent channels; and so the external reaction becomes different and more adequate, only to be reported in again by eye or ear, and so by co-ordination to produce again a new effort, etc.

The foregoing development uses the term 'co-ordination' with a twofold application: first, it is applied to the physical process in the brain, whereby, as we may suppose, different areas of stimulation are brought together for a united function in a very complex way. It involves at once greater complexity and larger unity. It is the type of function characteristic of the highest level, the cortex. The lower reactions, the reflexes, suggestive responses, etc., are each, when taken alone, independent in great measure; each acts for itself on its own stimulus. But cortical processes are not so. While they are more varied, they are also more unstable and more interconnected. They coalesce in a single function which does not show its enormous complexity on its face. For example, speech involves five or six well-localized areas co-ordinated in a common discharge, and it is rare that one is injured without injuring the common function which draws support from each.

On the mental side we find co-ordination also, and it is always a process which takes attention in the learning and, until it becomes fixed by habit, in the execution also, invariably. Every original co-ordination of stimulations involving desire, deliberation, effort, is an act of attention. This, of course, cannot be a mere incidental or unessential fact. All that we know of attention shows it to be too central a thing for that. It remains, therefore, among the problems yet to be answered, what attention is, how its rise takes place, and what its presence means in the beginning of voluntary movement.[1] Here we may remark that the function of consciousness, in this act of persistent imitation, seems to be exhausted in the fact of close attention to the 'copy.' The infant does not attend to his movements,[2] nor does he shift his attention from his copy to his own imitation, except between his efforts. On the contrary, in visual imitation, for example, he keeps his eye fixed on the movement, the tracing, or the action of the person whom he is imitating; and his success in the effort seems to depend upon the degree in which he is able to hold this copy series up steady and unchanged before him. How it comes that during this concentration upon the copy, and by reason of it, the muscular actions are conforming themselves more and more to its exact reproduction — this has been the topic of the earlier chapters on Development.[3]

The complex 'copy' of persistent imitation is necessary,

[1] See below, Chap. XV.

[2] So we have seen in connection with 'tracery-imitation,' above.

[3] Golf-players know the disastrous effects of taking the eye off the ball; the attention is visual, and the entire co-ordination, the stroke, is secured through it.

therefore, as a stimulus to the tentative voluntary use of the muscles. The theory that all voluntary movements are led up to by spontaneous reactions which result in pleasure or pain, and then get repeated only because of their hedonic result, will not hold water for an instant in the presence of the phenomena of imitation. Suppose H. endeavouring in the crudest fashion to put a rubber on the end of a pencil, after seeing me do it, — one of her earliest imitations. What a chaos of ineffective movements! But after repeated efforts she gets nearer and nearer it, till at last, with daily object-lessons from me, she accomplishes it. Here one of the most valuable combinations of thumb and finger movements is acquired, simply by imitation, and in the face of constant discouragement, anything but pleasant to the child. If it is due to the fact simply that movement gives pleasure, why does she not turn to other movements? Why persist in this one failure-bringing thing? Suppose there had been no impulse to do what she saw me do, no motor force in the simple idea of the rubber on the pencil, no instinct to imitate; what happy combination of Bain's spontaneous and accidental movements would have produced this result, and how long would it have taken the child if she had waited for experiences actually pleasurable to build up this motor combination?

In cases of persistent imitation there is more than association as such. The movements imitated are new, as combinations. It is probable, it is true, that various ideas of former movements are brought up, and that the child has the consciousness of general motor capacity, resting, in the first place, upon spontaneous impulsive reactions, and it is probable that this consciousness is a kind of massed or bunched sense of the particular member whose action is necessary, arising from former movements of it; but on this insufficient associational basis he strikes out into the deepest water of untried experience. For this reason, as was said above, I believe that in persistent imitation we have the skeleton-process of volition; meaning that at this stage consciousness is not held down in its motor outcome strictly to past reactions held in memory, but issues as a new and more adaptive co-ordination of them. Physiologically, we would expect that the brain energy released by such a new stimulus as the pencil-rubber combination would pass off by the motor channels already fixed by spontaneous, reflex, and associated reactions, *i.e.* that the child would be content with a motor reaction of the suggestive kind. But not so. He is not content until he produces a new reaction of this particular sort; and we must suppose that, in consequence of each effort of the child, the physical process is heightened and its issuing movement selected from, until the one copy is reproduced. Volition is a case of functional selection.

It will be strange, in my opinion, if this view of the origin of volition do not seem quite the most natural one. What are we really bringing about in willing anything? Are we not hoping that through us a kind of experience, object, thing in the world, may be brought about after the pattern of our idea or purpose? Are we not trying to actualize something which we think ought to be reinstated for us or for others? But is not this just the essential thing in imitation, — the reinstatement of something, the copying of what has already been in us, in others, or in the world? A child imitates automatically a sound he hears — one case; and then, remembering it but not hearing it, wills to make it — a second case.[1] Where is the difference in the type of occurrence in the two cases, as far as the child's active life is concerned? The only difference is that, in the former case, his

[1] Cf. Binet's exposition of James's view in terms of imitation (*Alter. of Personality*, pp. 156 f.).

ear brings to him what he imitates, and his motor apparatus is ready for it; in the latter case, his memory brings it to him, and his motor apparatus is not altogether ready for it. Is it not likely, therefore, that the simplest case of the more complex instance of this one typical process springs out of the most complex case of the simpler instance, — that the growing complexity of the conditions is just what is meant by the child's desire, and that the growing richness and explicitness and difficulty of the conscious performance, what is meant by his volition?

The position of volition in the progress of the individual, in his life history, may be depicted by a figure (Fig. XV.), the environment (1), in the shape of suggestion (2), in impinging upon the organism, stimulates to volition (3), which, when ratified and repeated, gives rise to habits (4), and these habits tend to become automatic reactions and impulses, only to come in contact with new suggestions from the environment, and so on. Thus the life plan becomes fuller and wider. I have used the spiral to denote this progress, which is continuous throughout the life period. Its analogue — the 'life-spiral' of race development — is given in the next figure below.

The crisis in the child's motor development, which is precipitated by persistent imitation, tends to come again and again to the front in later years in many interesting situations. The following game of my children, H., of five, and E., of nearly three years, reflects well the elements of choice, as the theory of the origin of volition requires them. I set the two children to walking fast around an oval table in contrary directions, marking the places where they were to meet, on the two opposite sides, with chairs drawn up to the table. They were to meet behind the first chair, shake hands, and then pass on to the second chair, and so on. On coming to the first chair, the smaller girl, E., was so impressed with the process of hand-shaking, in which she closely imitated her sister, and so thoroughly won over to her sister's action, that she invariably started off in the same direction with her, thus retracing her own steps, instead of passing on alone to

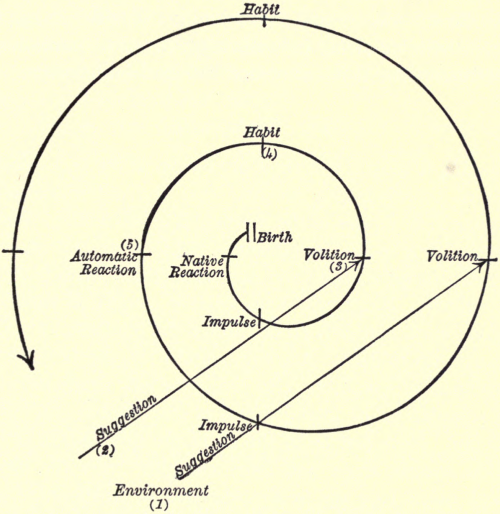


Fig. XV.—Illustrating Ontogenetic Development

the other chair. H. remonstrated with her again and again; and the child's conflict in motor impulses was instructive in the extreme. She always took at least one step with H., generally more, then turned and started off alone in a hesitating and uncertain way, and never seemed quite confident until she saw her sister coming around the table to meet her again.

Here it is easy to see that the course of a continued suggestive reaction — walking regularly forward — is brought into conflict with the new copy for imitation, supplied by her sister's action. There arises a balancing of motor processes, attention is divided, and the final course is the outcome of a co-ordination of these rival processes in the attention. So she *wills* — and it is a real act of will — to go on [1] around the table alone, but only after the great hesitation or embarrassment which is a true indication of deliberation.

§ 3. *Phylogenetic*

Coming to look at the place of volition in the race development of consciousness, we find that the determination of the method of its rise in the individual is instructive. Viewed objectively, a mental organism is subject, at any stage, to the two principles, Habit and Accommodation, already formulated above. Habit represents what is congenital with what it tends most naturally to do, under the guidance of all experiences up to date. Accommodation represents its degree of openness or adaptability, in giving the new reactions, which new stimulations or arrangements of stimulations call upon it to make. Now just as in the child the phenomena of suggestion became more and more complex, from the physiological reflex type up to the ideo-motor, deliberative, and, finally, the persistent type, which is volition; so, in the animal series, there is a corresponding development. Voli-

[1] This 'game,' which became very popular with the children, was really an experiment on my part, suggested, in meditation on this topic, by contrast to an earlier experiment which I tried with H., when she was in her second and third years. This latter was an attempt to bring out the regularity of the operation of suggestion, by arranging attractive things about a room, so that only after reaching one could she see the next, etc. I found her the victim, of course, to this device. She rushed from one of the objects to another with great avidity.

tion is found only in animals having ideation, memory, desires. Who can doubt that the dog desires the morsel which he holds upon his nose, awaiting his master's permission to eat it? All the conditions of desire are there: complex representation, incipient action, and inhibition. And who can doubt that there is volition when he gets permission and eats the morsel? But lower in the scale, such cases shade down into the sphere of suggestion, as the animal becomes less ideational, less social, more organic, and more dependent upon a small circle of stimulations.

In volition, therefore, we find the point of meeting of the two principles, Habit and Accommodation, and their common function. It is through volition that the levelling effects of habit are counteracted in the higher orders of life, since it brings possibilities of adjustment to absent and distant conditions, and so wages conflict with the dictates of present sensation. Yet it is through volition on the other hand, that new habits are formed. Only by the continued inhibitions and controls of volition is a new action which is still hard to perform preserved amid the pressing urgencies of what is old and easy. So volition ministers to both kinds of development, and sums them up; and so justifies both its survival and its splendid eminence among all the survivals in the mental series.

To put the same thought from the point of view of any given stage of evolution, we may say that two factors are potent in the manifestations of the character of an organism at whatever stage: endowment and environment. Habits add to endowment, and all accommodations are concessions of endowment to environment. Now, as is seen in Fig. XVI., the environment (1), working as suggestion (2), brings about a new volition (3), this is repeated by persistent reaction, and so forms habit (4), this is added to endowment (5) by natural selection,[1] and so constitutes an element of instinctive character (6), in later generations, and this character or instinct, in the new individual, again confronts the suggestions of the physical and moral environment (1). So we have in the highest exhibition of reflective volition no departure in type — however wide a departure it be in mean-

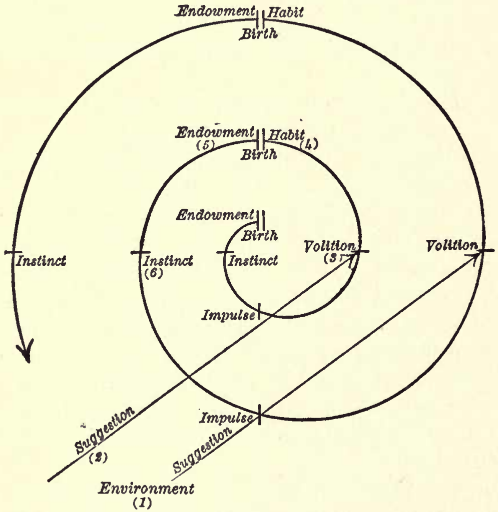


FIG. XVI. — ILLUSTRATING PHYLOGENETIC DEVELOPMENT.

ing and implications for philosophy — from the first adaptive reactions of organic life. Habit is formed, in the face of suggestion, through persistent imitation and volition, and habit, selected for character, is modified in turn by changed environment which is reacted to by imitation and volition.

[1] By selection of variations that 'coincide,' in Lloyd Morgan's phrase.

What is this but a phylogenetic exhibition of the 'circular activity' seen in all development? — just what we would expect, if volition is really a new, more complex form of the interaction of Habit and Accommodation in the growth of the individual.

§ 4. *Special Evidence*

Besides the very high presumption that volition, considered as a departure in the mental life, arises in the way of a new adaptation of the living creature to its surroundings, and that it also follows the law of accommodation by imitation which is the agent of all the earlier adaptations; and besides the presumption afforded by the great reasonableness of the view as based upon an adequate analysis of desire and volition — besides all this, there are several lines of objective evidence which connect early volition directly with reactions of the imitative type.

I. In the first place, the instances of so-called pre-imitative volition in infants, reported by various observers, can generally be explained in much simpler terms. The categories of suggestion which I have marked out in an earlier chapter, shading off into one another as they do by imperceptible degrees, seem to afford plenty of latitude for these cases. They differ greatly from the well-defined classes of movements called reflex, impulsive, automatic, etc., inasmuch as normal suggestion represents a side of mental growth which has heretofore gone largely unformulated. Reflex, impulse, instinct, etc., all represent habit, but they all presuppose accommodation, and it is only as we get some kind of a unifying principle of accommodation, that the partial statements of the law of habit get any common significance. Suggestion is the accommodation side of growth, all the way up to the most vivid forms of consciousness, and imitation is certainly — in its conscious form — the most direct form of suggestion. And even after volition ushers in a higher type of accommodation, suggestion still supplies most of its impetus. So when it seems impossible to assign a given reaction to any one of the categories of habit, that is no reason for leaping at once to volition, the most advanced form of accommodation; rather ought we to attempt to find its place under suggestion, which is the simpler form of accommodation.

Accordingly, we may, as the result shows, place all of the infant's so-called 'efforts,' in its early months, under the category of suggestion, only having to recognize certain cases which are, more evidently than others, germinal to volition. My child E., early in her second month, strained to lift her head at the sound of any one entering the room, and in her fourth month, after the child had been frequently lifted to a sitting posture by the clasping of her hands around her mother's fingers, the mere sight of fingers extended before her made her grasp at them and 'attempt' to raise herself. Now, as it happens, it is just the case of so-called 'effort' that is appealed to as showing very early volition. Preyer says:[1] "We may, therefore, without hesitation, refer the period of the first distinct manifestation of the activity of will in the infant in this field, to that week in which the head, while he is awake, no longer bobs hither and thither — in general, the fourth to the fifth month." That is, Preyer holds that the successful holding up of the head is voluntary, while the various unsuccessful attempts of the child to do so were possibly not.

These earlier 'efforts' are reactions perfected by association between the advantageous sensations secured through

[1] *Mind of the Child*, Vol. I., p. 265.

sight, taste, etc., while the child is held erect, and the muscular sensations of erectness. So Preyer holds, and this explanation is, I think, quite correct as far as it goes. But as to this particular act, we find these 'efforts' suggested by noises, sights, especially by personal suggestions, at such an early age that the reaction for erect posture is probably to be considered a matter of native congenital tendency, just as the walking reflex is. So that the whole thing becomes a case of physiological and sensori-motor suggestion. And even when acquired completely — when there is no 'bobbing hither and thither' — there is no need whatever to find in it, as Preyer does, evidence of will. We adults hold our heads up because our normal sensational series, especially of the visual and muscular sensations, and their correspondences, have been acquired since we have been holding our heads up, and so they all conspire by their associative influence to stimulate the contractions necessary for this head position. There is no need to bring in volition, or even attention. And it is probable that these associations only reinforce the native tendency I have spoken of. Such efforts, therefore, on the part of the child, lack deliberation, and all but, perhaps, the faintest glimmerings of desire.

A similar account may be given of 'simple imitation.' It does not involve volition; it is, rather, simple ideo-motor suggestion made possible by associations between visual, auditory, or other stimulations, on the one hand, and muscle sensations on the other. Here, again, I differ from Preyer, instead of having the advantage of agreeing with him, which the following quotation seems to give me.[1] He says:[2] "The first imitations are the first distinct, represented, and

[1] Professor Sully called my attention to this apparent agreement. See his remarks, *Proc. of Cong. of Exp. Psychol.*, London meeting, 1892, p. 55.

[2] Preyer, *Mind of the Child*, I., 340.

willed movements." This makes all imitations voluntary: both the simple and the persistent forms. Now Preyer recognizes such a distinction, — 'spontaneous' and 'deliberative' imitation are his terms, — but does nothing with the distinction. To me it is as fundamental in the child's development as the distinction between suggestion and volition, between reaction and conduct. Simple imitation falls easily under suggestion, because it may not involve memory, nor selection, nor variation, nor desire, nor deliberation, nor effort; only a sensation and a movement in organic connection. This is mere habit. How many of the essentials of volition does the parrot have, or the young bird that imitates the old one's flight? Why should these acts be thought voluntary? But persistent imitation, as we have seen, presents new problems: the breaking up of habit; vivid selection on the part of consciousness; the new, strenuous experience called effort; and the actual accomplishment of the new, by a real process of learning. Indeed, so great is the difference, that whenever a natural history view of consciousness, which involves continuous development, is desired, it is just this magnificent appearance of discontinuity which is the point of greatest difficulty; and it may be as well to remind the disciples of Maine de Biran, Reid, and William James, that the act of the infant's 'try-try-again' gives them their golden opportunity.

These instances may serve to show the way in which, as I think, the category of suggestion, on the accommodation side of mental development, has been neglected, with the result that the 'psychologist's fallacy' has been committed regularly by those who have read volition into the infant's consciousness at such early stages of its growth.

So far, therefore, as cases of so-called effort shade downwards into suggestions, they are properly classified as prevolitional. But there is a distinct class of phenomena in which the shading is the reverse, — cases in which the rudiments of volition must be recognized even in the absence of 'external copies' for imitation. This brings us, in a later section,[1] to the child's imitation of its own memories and imaginations, and to those cases which illustrate the relation of 'organic' and 'plastic' imitation to volition.

II. The results of a research on students, reported elsewhere[2] under the title, 'Persistent Imitation Experiments.' The subject is told to imitate a simple figure, called the 'copy,' set before him, drawing in pencil or chalk, at a single stroke. Then he compares his performance with the copy and tries

TABLE VIII

Copy	Will Stimulus (Av. No. of Efforts in Each Experiment)		No. of Experiments	No. of Persons
a. External visual, with comparison	3.57	ratio 1.72	51	6
b. External visual, without comparison	2.09			
c. Memory image after ten minutes, with comparison	2.	ratio 1.60	30	4
d. Memory image after ten minutes, without comparison	1.27			
e. Memory image after fifteen minutes, with comparison	5.66	ratio 1.55	6	1
f. Memory image after fifteen minutes, without comparison	3.66			

PERSISTENT IMITATION EXPERIMENTS: *A.* Influence of comparison = increase of will stimulus from about 75% to 50% according to lapse of time.

[1] Below, § 5 of this chapter.

[2] See *Proc. of Cong. of Exp. Psychology*, London, August, 1892, p. 51, for first statement.

again; and so on, until satisfied with the result. This done, the number of his efforts is noted. This I may call in the tables (VIII., IX.) the case 'with comparison.' Then he is instructed to go through the same experiment again, except that his eyes are now bandaged, so that he is not able to compare his own results with the copy. The number of efforts is noted as before. This is the case 'without comparison.'

Now it is evident that the relative number of 'efforts' in each case may be taken to indicate the amount of tendency the subject has to continue the imitation, — a quantity technically known as 'will-stimulus.' The results given in the tables show that in the case 'without comparison' the subject is liable to be satisfied with a smaller number of efforts; this would indicate that when the new visual picture is not reported, there is not the same will-stimulus. But in the other case, 'with comparison,' effort after effort is made, until success is attained, or until the subject gives it up; so the inference is that there is then continued will-stimulus until

TABLE IX

Copy	Will Stimulus (Av. No. of Efforts in Each Experiment)		No. of Experiments	No. of Persons
a. External visual, with comparison	3.57	ratio 1.79	51	6
b. Memory image after ten minutes, with comparison	2.		30	4
c. Memory image after one minute, without comparison	2.09	ratio 1.65	51	6
d. Memory image after ten minutes, without comparison	1.27		30	4

PERSISTENT IMITATION EXPERIMENTS: *B.* Diminution of motor force of memory after ten minutes = from about 60% to 80%, according as comparison is made, or not, of results with memory image.

either the motor plurality is overcome, or the stimulus effect is itself inhibited by discouragement. The figures (Table VIII., *A*) show that in the case of comparison there is an increase of from 75 per cent. down to 50 per cent. in the will stimulus for memory durations from one down to ten minutes.

Table IX., *B*. shows the further interesting result that if the external 'copy' be removed and the subject rely upon his memory, the number of efforts tends to decrease in some ratio with the length of time elapsed. This is what we should expect from other experiments on the faithfulness of memory,[1] which show that the memory process loses its definite character with time. The figures show a diminution of the motor force of a memory after ten minutes from about 60 per cent. to 80 per cent., according as comparison of results with the memory image is made or not.

This investigation gives evidence of the necessity for motor co-ordination — what is called 'comparison' — in the antecedents to voluntary movement. This is the essential contention of the doctrine of the genesis of volition stated above; and it is interesting to find that in our adult life our choices are still backed in a regular way by that dynamogenic agency called 'will-stimulus.'

III. Another kind of evidence is found in the behaviour of the attention. In a great class of pathological cases of

[1] Experiments on memory faithfulness have been made by Wolfe, by Ebbinghaus, by Müller, and by Warren and myself (*Proceedings of the Amer. Psych. Assoc.*, 1893, p. 18; see also *The Psychological Review*, 1895, pp. 236 f., cf. Kennedy, *Psychol. Review*, Vol. V., 1898, p. 477).

The method of testing memory by measuring the amount of motor force or 'will-stimulus' possessed by memories after various intervals, was first proposed in connection with these experiments (see *Proceedings of Cong. of Exp. Psychol.*, 2d Session, London, 1892, p. 51). This method is called the 'dynamogenic method,' and a correlation is suggested between the relative motor force of a memory, after a certain interval, and its degree of faithfulness to its original perception, after the same interval.

anæsthesia which involves paralysis when the eyes or ears are closed, but not when they are open — we find evidence that disturbances of attention bring about derangements of voluntary movement. This may occur even when the patient keeps intact all the apparatus of movement, and all the memories of the movements which he desires to make. And the result is sometimes reversed; a patient may be able to move a member *except* when he sees it. Here the visual images inhibit the movement.[1] In the former case, the attention has become dependent, for certain voluntary functions, upon immediate visual or auditory stimulation, and in its absence, these voluntary functions are impossible.[2] This shows that a degree of correlation of optical, kinæsthetic, auditory, etc., impressions is necessary for voluntary movement, and that this correlation is here, as everywhere else, a function of the attention. In normal voluntary movement, attention need not be given necessarily to the muscular movement itself, — although that is one type of voluntary attention, — but it may be given to some other kind of sensation, auditory, visual, etc., which has come to play the leading part in this particular movement, and under the lead of which the correlation which issues in movement is effected.

More is said of this below in the general theory of voluntary movement;[3] but here it may be noted how clearly this accords with what we found above to be the behaviour of the child's attention in performing its first voluntary drawings. His attention has to be fastened upon the thing or 'copy' imitated, not on his hand, nor on his memories of movement.

[1] Janet, 'Un cas d'Aboulie,' *Revue Philosophique*, March, 1891.

[2] See Binet and Féré, who report a patient who could thrust out his tongue only when he saw it in a mirror, *Arch. de Physiologie*, 1887, II., p. 371; Pick, *Zeitsch. für Physiologie*, IV., 1892, pp. 161 ff.; and Baldwin, *Philos. Review*, II., 1893, p. 206.

[3] Below, Chap. XV., §§ 3, 4.

Passy finds that a young child copies a new thing or copy by giving attention to his visual memory pictures. This is shown, as I have said above, by the fact that he puts into his drawing, certain features such as ears, arms, and minor details, which are not in the actual thing or copy, but only in his own earlier visual pictures. So I find that in imitating new words, there is a constant tendency on the part of the child, to reproduce terms he already knows in place of the words of the new lesson. In imitating speech also, the child does not learn by paying attention to the lips of the speaker. He sometimes learns the guttural letters, which are not spoken with the lips, sooner than many of the others. Much less does he pay attention to his own lips; from all appearances he does not know that he is using his lips. The most that lip sensations or memories do is to supply to him the series of associations which follow upon the auditory stimulations. It is these last to which he pays attention.

Cases are abundant not only in which aphasia follows lesions of the auditory centre, but in which it follows lesions located in the connections between the auditory and the word-seeing and word-hearing centres. Such a lesion interferes with the correlative or associative function. And it is indeed very suggestive of the new function found in persistent imitation, that while this latter often becomes impossible, in these cases, yet the simple imitative copying of sounds heard or movements seen, may still take place. Simple ideo-motor suggestion, as typified in simple imitation, remains intact; but persistent imitation, effort, the correlation involved in voluntary attention and movement, all this is lost. Janet thinks [1] the incapacity to feel objects by touch in certain cases, is inversely as the degree of customary recognition of the objects, their uses, etc.; which is to say, — when we

[1] *Loc. cit.*

come to understand that recognition may itself be simply due to an attitude of tendency of attention, — that the patient's ability depends largely upon the degree of involuntariness of attention, that is, of the degree of the simple habit of attending.

In view of what has now been said, the real difference between what is voluntary and what is not becomes very emphatic, and we have the key, I think, to the understanding of total *aboulia*, or lack of will, in cases of disease; and of partial *aboulia*, seen in the loss of particular voluntary functions, such as speech, writing, etc.[1] These matters furnish a further line of evidence which I shall now put forward.

IV. Evidence from aboulia, partial or total, may now be brought. The general principle of mental pathology that the dissolution of complex functions follows the inverse order of their acquisition, applies to the voluntary activities in two ways.

First, we should find stages of degeneration corresponding to the great epochs of mental development seen in the phylogenetic or race series; this would seem to require that vol-

[1] While not able to speak as an expert in Mental Pathology, I yet venture to express the opinion that there is only a difference of degree between the complete loss of will, the inability to make effort or to inhibit impulse, called aboulia, and the cases of the loss of particular voluntary functions only, — giving aphasia, agraphia, etc., — despite the apparent difference that, in these latter cases, mental determination or effort to do the act in question seems to be unimpaired. The patient in agraphia, it might be said, makes effort to write, but fails; his will is healthy, only his handwriting fails. On the contrary, the function called will really gets its right to be from the co-ordination of simpler functions; its stability and force must depend upon the support it gets from these co-ordinations of simpler functions; and the derangement of any one of them, such as handwriting, — unless of course the lesion be peripheral, — must withdraw support from the whole, and so weaken the function of will generally. We are all aboulic just to the degree in which our attentive co-ordinations are unstable and independent of one another. This seems to be required on any psycho-physical conception of will.

untary action should be impaired by a less serious derangement than are simple suggestive reactions; and that the derangement of the ideo-motor should precede that of the sensori-motor. Also that these last, which involve clear consciousness, might be damaged or absent while reflex functions still remain; and that, last of all, the rhythmic, so-called automatic processes, which are necessary to life in general, might remain alone upon the field. All of these propositions, except the first, which concerns voluntary action, are such commonplaces in psychology as well as in physiology, that I need mention them only to give new confirmation to the great features of the phylogenetic and ontogenetic parallelism on the side of mind.

But, second, this progressive impairment of mental faculty in the individual repeats inversely the process by which the individual himself learns his lessons in action. The man retrogrades literally into second childhood, both in regard to his power of mind as a whole, and in regard to the particular elements of any distinct functions which happen to be affected by disease or accident.

These two cases illustrate the two very distinct and instructive phases of voluntary failure, already characterized as total and partial aboulia. In the former case, the impairment is general, extending to the co-ordinating function as a whole, and so involving each particular activity equally. The old man writes tremblingly, speaks falteringly, recognizes faces and things badly, walks haltingly, — all of which follow from the fact that he is able to attend only partially and fitfully. In partial aboulia, on the other hand, one special function is impaired, or more; the rest remain intact. Here belong sensory aphasia, agraphia, arising from arterial obstructions, central lesion, etc. Some particular prop to the attention gets knocked away, and so one line of voluntary activity is seriously injured or destroyed; but the co-ordination of the other brain seats is still intact, and their functions are weakened only to the degree in which their structure of attention also rested upon this prop.

Both these cases of loss or impairment of will may be put in evidence as showing the place of volition in mental development, provided only the law be true that mind degenerates in the same order as it grows, only backwards; that is, that the function which it acquires latest, it loses first and most easily. We then have to ask what the actual facts of mental pathology are which show conditions of the impairment of will.

Considering total aboulia first, the condition of general levelling down or decay of the mental faculties gives us our instances. There are several recognized cases of such general mental break-down, all involving total or progressive aboulia; first, destruction of the cerebral hemispheres, corresponding to their removal from animals by the experimental physiologists; second, temporary subsidence of consciousness under the influence of drugs, or in derangement of the vaso-motor mechanism, as in faintness, trance, fits, etc.; and third, diseases distinctly recognized as mental, such as hysteria, of which the universal symptoms are certain derangements of consciousness, enfeebled attention, remarkable perversions of movement, etc. To these must be added idiocy or congenital mental defect.[1] Looking at each of these four cases, we find very evident confirmation of the view of volition explained in the foregoing pages.

In the various experiments recorded of extirpation of

[1] I omit the phenomena of old age, since neither physiologists nor psychologists have given them any very fruitful study. The appearance of what seems to be increased power of will — self-will — in old persons, is perhaps due to the great strengthening of habit, together with the general narrowness of consciousness.

the hemispheres, the phenomena now well known by the phrases 'psychic blindness,' 'psychic deafness,' etc., appear. These phrases are contrasted with 'cortical' blindness, deafness, etc. In the former, the animal loses all his sense of the meaning, associations, value, of what he sees and hears. He still sees and hears, and he still has reactions appropriate to sight and hearing; but he does not show the reactions peculiar to what he has learned, in all his life, *about* what he sees and hears. After certain operations upon his brain the dog sees a whip, but is no longer afraid of it; sees food, but no longer moves forward to secure it; hears a voice, but no longer recognizes it. What psychologists mean by 'apperception' — the *understanding* of a thing, as opposed to the mere *seeing* or *hearing* of it — this is gone. The thing seen or heard is no longer a co-ordinated thing, built up of memories, varied sensations, motor dynamogenies, and pleasures or pains; but it is a bare, worthless stimulus to reflex or suggestive reaction.

Lack of co-ordination? Then lack of attention, lack of persistence, of effort, of volition! 'Exactly,' says the brainless pigeon, 'that is what I lack.' Sustained attention, effort, volition — these are the correlatives of the co-ordinations of memories with present sensations, the motor correlatives of association and apperception. Lack on one side, the sensory, then *a fortiori* lack on the other, the motor. The motor it is, exactly, which holds the sensory elements together. The creature shows, in fact, no complex activity, no curiosity, no constancy of attention, no persistence in his undertakings — indeed, no undertakings, no adaptation to new conditions. He lacks all means of taking care of himself, and perishes of hunger with food under his nose.

Now substitute men for dogs and pigeons, and substitute disease or drugs for the operator, and you have, in cases of varying clearness, cases of general progressive aboulia in man; all those cases in which consciousness subsides into the depths of mere vague feltness, so to speak, or sensations coming in and movements made upon them. Two typical instances may be cited, the two for which we have exact observations. One of these is the rather obscure phenomenon of 'Jacksonian re-evolution,' and the other is the case, equally obscure until very recently, of hysteria.

By 're-evolution' is meant gradual recovery from a swoon or fit of such a gross character that the mental faculties had given way, and the patient had become all but unconscious. It is evident that in such cases, in which the recovery is comparatively slow, tests may be applied at intervals to discover the order in which the various functions return; this order will evidently represent the inverse order of their loss in the fit, and so the original order of their development.

A recent case reported by Pick[1] furnishes perhaps the most careful and detailed observances yet made on the re-evolution of the function of speech — a function which, by reason of its complexity, lends itself to recovery by stages. Four stages were found in this epileptic patient's recovery from apparent unconsciousness: first, no response whatever to words spoken or written; second, the parrot-like repetition of words heard (an imitative condition called *echolalia;* the man could strike a match only when he saw some one else strike one); third, a dazed sort of reply by counter-questions; and fourth, intelligent speech with voluntary forming of sentences.

The evidence from such cases as this as to the place of volition in the evolution scale is self-evident. The first form of response, echolalia, is simple verbal imitation, *i.e.* sensori-motor suggestion from a brain-level below the cortex. It involves no extended associations. The next stage represents,

[1] *Archiv für Psychiatrie*, XXII., Heft 3, pp. 25 ff.

I think, a groping of the man after unity, coherence, co-ordination; just as the child gets dissatisfied with his simple imitations, has a sense of dawning capacity to identify, compare, and select, of a tendency to be a willing being; and gropes toward the next stage of development. Then comes the recovery of the centres and their connections. The man's associative channels open up and the currents flow in and out. He remembers his word-meanings, compares them, feels the proper energies tingle in lip and tongue in co-ordinate movement, and so reaches voluntary speech again. In short, volition in speech has come back on the basis of simple imitation, through a period of tentative trial and effort to co-ordinate movements. Could there be a reconstruction in plainer terms of the child's attainment of voluntary speech through imitations, tentative and then repeated; or a plainer demonstration that the normal way of volition is through imitation?

The other case — the general phenomena of hysteria in their varied combinations — may be spoken of only in a general way, since the quotation of observations would be too lengthy. For authority, let us appeal, as before we have done, to Professor Pierre Janet, whose works are more psychological than those of most professed alienists, and who, unlike many of the rest, is aware that there are philosophical problems in the world, no less than medical. At the end of a recent discussion of 'Definitions of Hysteria,' he concludes by himself defining hysteria thus:[1] "A disease especially characterized by mental symptoms of which the principal are enfeeblement of the faculty of mental synthesis; retraction of the field of consciousness; the disappearance of a certain number of elementary phenomena — called stigmata — from consciousness

[1] 'Quelques Définitions récentes de l'Hystérie' in *Arch. de Neurologie*, Juin et Juillet, 1893.

and from personal perception; a tendency to the permanent and complete division of personality; the formation of many independent groups of phenomena; the coexistence of these systems with each other or their alteration by each other, giving rise to crises, somnambulisms, subconscious actions; and finally, through the defect of synthesis, the formation of certain parasitic ideas whose development is so complete and independent that they break up all normal control of consciousness and manifest themselves in various troubles of a physical and accidental sort."

From this definition and from the description of the phenomena by Charcot and other writers, we may say that the outstanding psychological characteristics of this sort of malady are: (1) 'enfeeblement of the faculty of psychic synthesis'; (2) loss of control and direction of the mental life; (3) the breaking up of the material of personality, and the possible formation of several independent psychic groups, either successive or existing together; (4) an enormous development of the tendency to imitation; (5) the growth of mental suggestibility, tending to the complete dominion of controlling ideas and imperative movements, all of which contribute to a last characteristic — (6) general and progressive aboulia.

Here, again, we note at once, that with enfeeblement of mental synthesis goes increased suggestibility, which takes the form, whenever possible, of direct imitation. And, further, we find the process of re-evolution striving to do its proper work in the tendency of the separate groups of psychic facts to take on the semblance of personality by partial synthesis. As James puts it, they 'tend to personal form.' What is this but the reverse way of mental growth, whose terms are in order: simple suggestion, — sensori- and ideomotor, — imitation, synthesis, which last, in its various stages, illustrates the growing success of effort, and the growing independence of the one great synthesis whose pre-eminence stands for stable personality and intelligent volition?

The absence of effort in certain cases is shown in the fact that the patients are often unable to learn any new movements, although they can perform, in response to a suggestion, those which have become habits,[1] — just the condition of the child before its first 'persistent' imitations.

A further interesting confirmation of the distinction between voluntary and involuntary imitation is seen in the phenomena of unconscious writing, from which the hypothesis of 'secondary personality' gets some support. The anæsthetic hands of certain blindfolded patients respond in writing appropriately, either in lines of habit, or by imitative repetition. Not only are the movements here involuntary; they are also quite unconscious.[2] And the view that the attention and the co-ordination which it effects are the real vehicle of volition is shown in the negative[3] fact, that as soon as the patients are allowed to see the limbs in question, which they believe they cannot move, no response whatever from these limbs can be secured. This belongs to the theory of 'control' taken up in a later connection.[4] Furthermore, the anæsthetic hand, hidden behind a screen, will imitate the movements made by the patient voluntarily with the unanæsthetic hand, giving

[1] Janet (*Aut. psy.*, p. 64) calls this condition, on the memory side, 'anterograde amnesia' — an unfortunate phrase, I think. It is simply, so far as action is concerned, general 'apraxia,' or the inability to effect the synthesis necessary for a movement.

[2] See Binet and Féré, *Arch. de Phys.*, 1877, II., pp. 339 ff., and Binet, *Alterations of Personality.*

[3] Negative, *i.e.*, to the other remarkable case of patients who cannot move the limbs *unless they do* see them. In the cases now cited, voluntary movement is impossible, and the incapacity is extended by suggestion to the involuntary movements of the organ upon which the attention is fixed. For the other, contrasted, cases see the reference given in the next note but one.

[4] See Chap. XV., § 4, below.

what may be called acquired 'accompanying movements.' [1] And yet again, the anæsthetic hand traces out, when a pencil is put into it, and it is left undisturbed, mental pictures as they exist in the subconsciousness of the owner of the hand — what I have called, in the case of the child, simple 'tracery-imitation.' The development of this tendency under the law of habit accounts, by the way, for all the 'intelligent' results of automatic writing.

Cases of congenital mental defect, of which idiocy and imbecility are the extremes, teach us about the same thing. Weak-minded children are notably different from other children in two things: the difference in the character of their early movements, and the difference in their ability to learn new movements. In regard to the first point: their movements are abrupt, undisciplined, isolated from the rest of the organic happenings, jerky, and essentially unaccountable. The normal child gets disciplined by his first experiences, and his movements show the subduing and regulating effects of all kinds of suggestion. But the child which we call, in varying degrees, 'natural,' is not so; much that we mean by acquired nervous inhibition is wanting, and the character of the movements becomes at once an index of the mental state. He imitates, but repeats his imitations without modification. He lacks voluntary power both for action and for control.

This characteristic leads at once to the second: the child fails to *learn*. He progresses as far as the natural growth of the organism carries him. All his senses may be perfect; his vegetative processes normal; his reflexes good; his native reactive couples responsive. This means, in general, that he grows well up to the simple imitative stage; then he stops! Stops where, *in the reverse process of unlearning*, the hysteric and hypnotic patients stop! He gets a few useful associations

[1] Binet and Féré, *loc. cit.*, pp. 340–345.

drilled into him by force of habit. He may come to do the simpler things which he sees others do, and make the simpler word sounds which others make. But he does not initiate anything, does not learn by his own effort. He is much like the brainless pigeon. Idiots are generally very imitative. Imbeciles are lower still; if they get any form in the sounds they emit, it is only what Séglas calls 'reflex echolalia.'

I think this indicates very fairly, in these poor defectives, about the condition of things which we have found in cases of hysterical and cataleptic degeneracy. Here is the same lack of mental synthesis, so-called 'mental' blindness, deafness, dumbness,[1] the exaggeration of unruly movements, inability to acquire anything new, excessive imitation, general suggestibility. The idiot lacks the 'third-level' co-ordination, just as all the rest do. Voluntary inhibition is gone, and, in a measure, involuntary inhibition also. Attention is weakened, vacillating, inconstant. Hereditary defect has done, in this case, what disease has done in the other cases, *i.e.* it has drawn a sharp line between action which is imitative and simple, and action which is still imitative, but complex, — the latter alone being persistent, effortful, acquisitive, voluntary. These poor creatures have mental images, and make responses to them, but they are unable, in Janet's phrase, *d'effectuer la synthèse.*[2]

Passing now to what has been designated partial aboulia, we have to consider the decay or destruction of particular

[1] The expression 'mental dumbness' was suggested by the present writer for the inability to speak intelligently, as opposed to the mere ability to imitate sounds. See the article, 'Internal Speech and Song,' *Philos. Review*, II., 1893, p. 389. See also, below, Chap. XIV., § 1, p. 415.

[2] The characteristics of the idiot's movements are given by Guicciardi, *Zeitsch. für Psychologie*, IV., p. 154, as, in order, progressive inco-ordination of voluntary movement, loss of voluntary movement, increased imitation.

motor functions, asking whether, if we apply the law that the order of loss is the inverse of that of development, we find evidence for our theory of the rise of volition. This examination can best be made in connection with complex functions or acquisitions, and speech and handwriting at once suggest themselves. I accordingly have to cite evidence from *aphasia* and *agraphia*. Other functions which do not involve so clearly the complex co-ordinations learned by voluntary effort may also be cited in their place as we proceed.

It may be well to give, at the outset, the general result of the detailed examination of cases of such troubles. The order of acquisition of the elements of speech and handwriting is this:[1] first, in the stage of suggestive reaction before the rise of conscious imitation, we find hearing of sounds with some very simple associations, also suggestive adaptation of movements of the tongue, hands, etc., under the direct stimulus of associations, pleasures, and pains, etc.; second, in the stage of simple imitation, we find full recognition of objects and musical tunes, some slight power of song in individual children, imperfect articulation, increasing co-ordination of movements, though still without effort or volition; third, in the epoch of persistent imitation, we find full understanding of speech, the rapid acquisition of co-ordinated movements in speaking and writing, and also visual sign interpretation which leads on to the ability to read.

On the side of disease, therefore, we should expect, if the acquisition proceeds by stages so well marked, that at least the same three great types of function would be reasonably independent in their loss. That is, we should find that the highest type of function, revealed in volition and conscious synthesis, would in some cases be lost alone, and that to its

[1] Cf. the left column in Table X.

loss might then be added that of the function which corresponds to perception and simple imitative adaptation. Finally, in the most fundamental derangement of all, even the degree of acquisition represented by direct imitation and reflex speech, etc., should be impaired along with the two higher kinds.

Our expectations are so clearly fulfilled in current interpretations of defects in the active life,[1] that the very nomenclature of the subject gives us words for these very distinctions. Loss of the first type is called, as we have seen, psychic blindness, deafness, etc., according as one sense or another is affected, issuing in associative ataxia or aphasia. The term *dyslogia* has been applied to this state by Séglas. It has equal application to various functions, but applies especially to speech. The second stage has had, if not equally general recognition, equally happy characterization by the same author, who calls defects of speech of this general nature *dysphasia*. It is aphasia of the sensory or motor type, due to the loss of a specific kind of sensory or motor memory through a lesion in a specific centre. Finally, the greatest defect of speech is *dyslalia*, or aphasia due to lesions in the lower centres.

We may now, before going into more detail, draw up a table showing these functions, and the corresponding defects of the three great classes described, using the terms current for the function of speech, but bearing in mind the general application of the divisions themselves to complex motor acquisitions in general. See Table X.

The main point in discussion — the origin of Volition — is isolated in the question as to the distinction between dyslogia and dysphasia. The question is this: Do we find that whenever the mind is impaired to the degree designated, in respect of special acts, by the phrase amnesia, — the loss

[1] Cf. the right column in Table X.

TABLE X

	Order of Acquisition.	Order of Loss.		
1. *Pre-imitative Suggestion*	Hearing of Sounds	Cortical Deafness	*Dyslalia.*	3.
	Random and Inherited Movements	Motor Aphasia		
	Movements co-ordinated by Simple Suggestion, Pleasure and Pain, etc.	General Ataxia		
2. *Simple Imitative Suggestion*	Recognition of Objects	Object Blindness Verbal Deafness	*Dysphasia.*	2.
	Words and Tunes	Rhythmic Deafness		
	Imperfect Articulation	Partial Ataxia Sensory Aphasia		
	Slight Power of Song	Sensory Agraphia Motor Amusia		
3. *Persistent Imitation*	Understanding of Speech	Verbal Amnesia	*Dyslogia.*	1.
	Use of Objects, etc.	Apraxia, Psychic Blindness, etc.		
	Voluntary Co-ordination of Movements:			
	Speaking	Amnesic Aphasia		
	Writing	Amnesic Agraphia		
	Music performing	Amnesic Amusia		
	Visual Interpretation of Signs and Reading	Alexia		

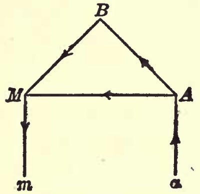
of some function demanding spontaneous co-ordinated memories, and action in view of such co-ordinated memories, — effective volitions are then impaired, while purely sensori-motor action remains? In other words, do these kinds of aphasia — speaking of speech in particular — show a functional line between persistent effort and simple imitation?

In support of the truthfulness of the exhibit from pathology made in the table I may make certain observations: —

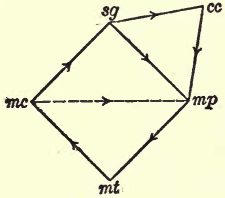
Among the numerous schematic diagrams which have been proposed to illustrate aphasia in its different forms, that of Lichtheim has had most recognition.[1] It is not my purpose to add to these constructions, which have represented, in part at least, the individual interpretations of the particular writers. The 'motor square' which has been found serviceable in the preceding sections, presents a modification of Lichtheim's scheme in the one direction in which current psychology finds some of its most important problems; and it thus enables us to bring the problems to aphasia into connection with general psychological theory. Lichtheim's diagram, Fig. XVII., a., gives no means of distinguishing between the centre of muscular sensations and memories, the kinæsthetic centre, on one side, and the true motor centre, the innervation centre, on the other side; but includes both, under the one symbol *M*. In my 'motor square' diagram, Fig. XVII., b., these two possibly distinct areas, and perfectly distinct functions, are distinguished (*mc* and *mp*), thus making it possible to represent, diagrammatically, a distinction current in psychology. The distinction is required in the interpretation of cases of aphasia. Lichtheim himself admits this, and constructs an awkward supplement to his

[1] *Brain*, Part XXVIII., January, 1885, p. 436 (his Fig. 1).

diagram when he comes to interpret certain individual cases.[1] If the 'motor square' be squeezed together, so that the opposite corners, *mc* and *mp*, coincide, it then becomes identical with Lichtheim's. The isolation of *mp*, however, is required by all the evidence now accumulated, which goes to show that movements may be stimulated directly from the sensory centres (*sg*; sight, hearing, etc.), or directly from the higher co-ordinating centre (*cc*, Lichtheim's *B*) — supposing it to exist, as all the diagrams, interpreting the facts functionally,



a. Scheme of Lichtheim.



b. Motor Square.[2]

FIG. XVII.

represent — without necessary stimulation of the kinæsthetic cortical centre (*mc*). This class of cases, now very generally accepted, has no separate recognition, I think, in any of the schemes except the 'motor square.'

Interpreting the 'motor square' in terms of the three great functional classes of motor acquisitions, we may say

[1] *Loc. cit.*, pp. 437, 443, 451 (his Figs. 2, 4, 5).

[2] For the other symbols, see Fig. IX. My use of this diagram, before I saw Lichtheim's, in class-room demonstration of the 'motor' problems in psychology, has proved it so convenient that I have ventured to print it in my text-books. Most of the diagrams proposed by others are intended to illustrate the different sensory areas which contribute to speech (Charcot's, Kussmaul's in *Störungen der Sprache*, p. 182, etc.); these centres are all bunched in Lichtheim's and mine, the purpose being to illustrate *types* of motor disturbance, rather than particular local lesions.

that aboulia, and the equivalent dyslogia, result from some disturbance in *cc*, or its connections, whereby this co-ordinating centre (Lichtheim's *Begriffscentrum*, *B*) is cut off, either (1), from the motor discharge centre *mp*, for the particular function in question, or (2), from the centres (*sg*) from which the stimulus or material of co-ordination comes. All the varieties of amnesia fall under (2), in so far as the particular memory pictures whose absence constitutes the amnesia observed, are necessary to the concentration of attention by which the voluntary performance of the action in question is brought about. That is, it is possible that a particular case of inability to employ intelligent speech may be due, apart from injury to *cc*, to a lesion which breaks any of the three connections *cc*, *mp*; *cc*, *sg*, *mp*; or *cc*, *mc*, *mp*. The other case (1) includes instances in which the failure to speak is due to lack of ability to get the attention fixed upon anything which would represent the movement itself apart from both kinæsthetic impressions and special sense memories. Such cases are cited in proof of innervation sensations and memories due to the condition of the motor discharge centre itself.[1]

The other cases of possible lesion in this highest region, involving aboulia only, represent respectively sensory amnesic aphasia of the several kinds known as visual, auditory, etc., and motor amnesic aphasia. It is evident that a break in the line *cc*, *sg* would accomplish both of these; that is, the patient would be unable to speak voluntarily, however he might preserve all his special centres, both sensory and motor.

[1] So Waller's region (*Brain*, XIV., p. 179, and XV., pp. 380 ff.), which is called by him the 'locus' of subjective as well as objective fatigue, would, if cut off from its connection with the co-ordinating centre, produce aphasia, even when the kinæsthetic sensation series were all intact. This possibility, whatever we may think of its probability, it is impossible to represent on Lichtheim's or any other of the earlier diagrams.

This is the case where a patient is unable to speak or write spontaneously, although he can repeat or write words which he hears or sees, written or printed (using the line *mc*, *mp* or *sg*, *mp*). It is possible, however, since the symbol *sg* represents the various sensory seats taken together, that a function like speech might in some cases not be impaired when a particular connection *cc*, *sg* is cut, since the attention might be stimulated by a discharge from an alternative sensory seat. This alternative arrangement gives its validity to the distinction between the so-called types of speech, as auditory, visual, motor, etc.

It is evident, therefore, that a certain very important class of functions would be left to a man of such partial aboulia. First, he might be able to perform a voluntary function when his attention was supplied with some indirect stimulus: so the cases in which voluntary movement is possible only when the eyes are open. Or, second, he might be able to perform other voluntary co-ordinations in which the particular class of memories now cut off are not essential elements; and third, he might be able to perform, reflexly or by suggestion, imitation, etc., functions which he could not perform voluntarily.

All of these deductions respecting aboulic patients are securely established by pathological facts. The last-mentioned is the critical distinction for our purposes, and some cases illustrating it may be cited. They are selected with two especial points in view: first, as showing the fact of conscious simple imitation in patients to whom all effortful performance of the actions had become impossible; and, second, as showing the inability of such patients to learn again the function which is lost, without resorting to a painstaking repetition by imitation of a new kind of motor association. By this means such a patient may train his attention over again upon a new class of memory images.

1. Case of Pick already cited.[1] This man was able to strike a match only when he saw the proper movements of another (pp. 764 and 768). He echoed words he heard, and he even repeated with the questioning inflection questions addressed to himself (pp. 568–569 and 771–773); but he had lost all spontaneous speech. Pick interprets the case (p. 774) as one of 'transcortical word-deafness' described by Lichtheim and Wernicke, which arises from a lesion of the line *BM* in Lichtheim's diagram, or of the line *cc, sg* in the 'motor square.' It is a case of verbal amnesic aphasia, or dyslogia involving aboulia, but not dysphasia.

2. Case of Pitres,[2] showing agraphia, in which 'tracery-imitation' remained. This case also shows the possible mutual isolation of speech and writing, inasmuch as there was no aphasia. Here we have a lesion of the tract *cc, sg* (Lichtheim's *BM*) for writing movements only, the lesion not extending to the corresponding tracts for speech movements.

3. A different complication is shown in another case cited by Ross,[3] in which deep-seated aphasia (dysphasia) is associated with alexia, without agraphia. This patient's speech movements were probably dependent upon the visual word centre for stimulation, while his writing movements were not so dependent; consequently alexia (lesion of the visual word centre) carried with it amnesic aphasia, but not agraphia.

4. Case cited by Lichtheim.[4] It shows the preservation of a variety of simple imitative or ideo-motor suggestive reactions, while the corresponding voluntary functions were

[1] *Archiv für Psychiatrie*, XXII., Heft 3.

[2] Cited by Ross, *Wood's Medical Monographs*, Vol. VI., No. 1, 1890, pp. 152–153.

[3] *Ibid.*, pp. 197–199.

[4] *Brain*, VII., 1891, p. 437.

lost. The patient could copy handwriting, write to dictation, repeat words heard, and read aloud, but he could not write nor speak spontaneously. It is accordingly a case of amnesic aphasia and agraphia, involving loss of the voluntary functions *only*. This case is a very fine illustration of my thesis, inasmuch as it shows the action of the principle of Habit, whereby activities at first learned by persistent effort have become ideo-motor, so that it is only their *voluntary performance, and the ability to learn more*, which are impaired by the injury.

Again there are cases which show a finer application still of the law of Habit, in connection with each of the functions of voluntary movement. It is impossible to say beforehand just how much or how little of what is, as a whole, an action learned by imitative effort still involves voluntary control at any time. A great part of any one of our habitual actions is regularly under subcortical or ideo-motor control, except for inhibitions or unusual exercises of it.

We find that speech, for example, is subject to a great many finer degrees of impairment. Sentence-making may be impossible, while the words taken alone may be spoken. Words again may be impossible, while the simple syllabic sounds may be quite possible. Certain classes of words, as nouns and names, may disappear, while other classes of words remain. And finally, all that the patient may be capable of is some single oft-repeated sound.[1] In all this we see reversed the child's progress from simple imitation of sounds, to effortful repetition, then to the co-ordination of sounds or syllables into words, then to imitations of short

[1] See Kussmaul, *Störungen der Sprache*, pp. 9 and 164. Also Bateman, *On Aphasia*, p. 75. Ribot traces this progress, as a phenomenon of memory, *Maladies de la Memoire*, pp. 132 ff.; cf. Brazier, *Revue Philosophique*, October, 1892, p. 364.

sentences which he hears, and finally to spontaneous combinations of his own to express his meaning.

A similar series of facts is found also in agraphia, or derangements of writing; stages in which there are, in order, certain defects becoming more and more grave. There is trembling handwriting, failure to write sentences, when certain words can still be written; failure to write words, while musical notation, or single letters, or both, may still be written; failure to write letters, while figures[1] may still be written; failure to write anything except to dictation;[2] and finally, failure to write at all without copies, although copies may still be traced. Here is retrogression from the highest coordination of hand movements, down to the tracery-imitation already described;[3] the final stage being that in which meaningless scrawls show the absence of all central coordination.[4]

So in the case of alexia, or impairment of reading; a function which may be destroyed without impairing either speech or writing.[5] It may extend to the reading of handwriting only (even the patient's own[6]); or to reading of music notation only;[7] or to all printing and handwriting except numerical figures;[8] or to all but drawings and outlines of objects; or to all signs except music notation; or, finally, to all interpretation of visual signs; in which case

[1] Case of Déjerine, *Com. Rend. Soc. de Biologie*, Feb. 27, 1892; cf. *Brain*, 1893, p. 318.

[2] Lichtheim's case, *Brain*, VII., p. 447.

[3] Above, Chap. V.

[4] See Starr's case, *Medical Record* (N.Y.), XXXIV., 1888, p. 500.

[5] Alexia without agraphia is rare; but see the remarkable case of Déjerine cited in the second note above. Agraphia came on subsequently in consequence of a second lesion found at the autopsy.

[6] Oppenheim, *Charité Annalen*, XVII.

[7] Ballet, quoted by Wallaschek.

[8] See Glashey's case, *Archiv für Psychiatrie*, XVI., 1885, p. 661.

only simple sensations of sight remain, and the patient reaches the condition called psychic blindness.[1]

Recent observations show a corresponding analysis by disease of the faculty of musical expression. The power of playing on instruments, or singing by note, may be lost, while familiar selections may still be executed from memory; and, when the disease has developed further, an air becomes impossible from memory, but may still be executed by the imitation of another's performance.[2] Oppenheim cites the case of a patient who could not sing until the words of a familiar song were spoken to him,[3] although he could not repeat the words; and Franckl cites the case of a patient with right-sided hemiplegia, agraphia, alexia, and aphasia to the extent of echolalia, who yet sang one song, but without the words.[4] These last two cases[5] illustrate purely suggestive or automatic singing.[6]

The connection between speech and music which has been spoken of above,[7] may also be serviceable in another way. Patients have been reported who could speak only by singing the words. In such cases they may be able thus to understand the words,[8] or even yet not to understand them. The latter illustrates the reflex or suggestive movements of speech, which

[1] Cf. the analysis into five stages of defect in reading, by Weissenberg *Archiv für Psychiatrie*, XXII., 1891, p. 442.

[2] See Brazier, *loc. cit.*, and Case 3 of Oppenheim, *Charité Annalen*, XIII., 1888, p. 354, quoted by Wallaschek, *Zeitschrift für Psychologie*, Vol. VI., p. 8.

[3] *Loc. cit.*, XIII., p. 358; cf. also Wallaschek, *loc. cit.*, p. 12.

[4] Franckl-Hochwart, *Deutsch. Zeitsch. für Nervenheilkunde*, 1891, I., p. 287.

[5] See also another of Oppenheim's (a man who could not read, but yet sang off correctly a printed musical score), *loc. cit.*, p. 364; and yet another, of a boy who sang a tune in his eleventh month, before he learned to speak (Wallaschek, *loc. cit.*, p. 13).

[6] See my own case above, Chap. VI., § 5, *ad fin.*

[7] Chap. IV., § 2.

[8] Case referred to by Starr, *Psychological Review*, I., 1894, p. 92.

may be stimulated through the centre of the understanding of music, whether it be visual or auditory. Gowers accounts for this latter case by the observation that the text, in musical execution, is simply a convenience, not an essential, and the meaning of the words is, in learning, entirely subordinated to the correct music.[1] It is again essential to remark here, — in order to keep our argument clearly in view, — that there may be aboulia for musical execution, leaving reflex or imitative execution intact; but that in such cases no new musical acquisitions can be made.[2]

V. Still another class of facts may be cited as affording evidence in favour of this view of the rise of volition; the facts of brain development, as comparative embryology and early brain anatomy supply them. Two very general questions arise in view of our present topic: we are interested to know, first, what kind of motor apparatus the child is born with; and, second, in what order he adds to his motor equipment in the way of activities which may be described as voluntary. In answer to the first question, we may say without hesitation that the child begins life without the necessary apparatus for any voluntary action whatever. He lacks two

[1] *Diseases of the Brain*, 1885, p. 122.

[2] The final loss of the imitative function as involved in gesture, general movement, etc. (so-called *amimia;* see Kussmaul, *loc. cit.*, pp. 159 ff., and Ballet, *loc. cit.*, p. 75), and its amnesic phase need not be dwelt upon. Amimia reduces the patient to the stage of pre-imitative suggestion, again confirming the reverse parallel between order of acquisition and order of loss. A case recently reported by Mills in *Philada. Hosp. Reports*, 1893, brings out the facts clearly. A patient, having right hemiplegia and motor aphasia, without word-deafness, lost all *expression by movements of any kind*, except that he uttered 'la-la' over and over, and could still laugh when pleased. The expressive movements which he retained longest — apart from those mentioned — were the 'nod' and 'shake' of head to signify 'yes' and 'no.' As we would expect, facial expression usually remains intact, even in cases of amimia which involves all voluntary pantomime, gesture, etc.

very important, indeed essential, things: associative connections between the lower central organs and the cortex, with all traces of medullated nerve fibre; and, second, his cerebrum has not developed the different local centres and their connections with one another. So far there is no dispute.[1]

In regard to the second inquiry, — the time and order of development of complete activities, — experimental evidence is largely lacking and anatomical evidence is notoriously uncertain. Putting the anatomical evidence, however, with that of comparative physiology, we see ground to justify us in the position that volition is a matter of cortical co-ordination, occurring possibly about the sixth to eighth month, after simple imitation has become common and varied. It should be borne in mind, however, — lest this seem like special pleading, in view of the very scanty evidence at hand, — that it is not a question here of what *is* the true hypothesis, but of what alternatives *may be* true.

The main facts now known may be thrown together very briefly. Soltmann[2] found that young dogs did not respond to stimulation of the cortical motor centres until nine days old, *i.e.* until two days after the eyes were open; then the reaction came first only from the fore paw. The same results were shown by looking for laming in the dog's movements after extirpation of the motor centres. Further, Soltmann, in considering the analogies of structure, finds voluntary action in the child beginning from the middle to the end of the first quarter-year, and that it develops first for the arm, then hand, and last for the leg (the dog's hind paw was quite lawless — *regellos* — in its responses to stimulation as late as the sixth month). These deductions are accepted by

[1] Foster, Preyer, Bastian, Soltmann, Meynert.

[2] *Jahrbuch für Kinderheilkunde*, IX., 1875, pp. 115 ff.

Vierordt.[1] Further, Soltmann finds that the child does not get the eyelid-touch reflex, which is a cortical reflex, till its seventh or eighth week.

Again, authorities have shown that the composition of the brain is not favourable to cortical action until the seventh month. The nerve sheath is absent in the brain, the quantity of water is very large as compared with the later brain condition,[2] the necessary fibres have not developed between the motor cortex and the striate bodies (Vierordt), and certain cells then undergo changes making them comparable to the voluntary cells.[3] Meynert [4] has found further lack of preparation in the nerve courses of voluntary action in the human infant of four months. As to the difference between the young dog and the human infant, Ferrier says, in discussing Soltmann's results, "The degree of development and control over movements which a puppy reaches in ten days or a fortnight are not attained by the human infant under a year or more." [5] Further, if we suppose that in the child, as in the dog, the sight function is the first to develop its connections sufficiently to stimulate to voluntary action, we may fall back upon the researches of Flechsig, showing that fibres from the sight centres in the occipital cortex do not begin to appear in the child until the second or third month. Bernheim quotes Parrot to the effect that the nervous apparatus is not entirely ready for voluntary action until toward the end of the ninth month.

However uncertain some of these detailed observations and deductions may be, it is nevertheless easy to strike fair

[1] Vierordt's *Lehrbuch der Kinderkrankheiten*, Bd. I., p. 420.

[2] Wiesbach, *Archiv für Psychiatrie*, II., III.

[3] Jastrowicz, Parrot (*Arch. de Physiologie*, I., 530 ff.), Virchow.

[4] Cited by Soltmann, *loc. cit.*

[5] *Functions of the Brain*, 2d edition, p. 364.

limits inside of which we may say conclusions are safe. Let us say, therefore, all allowances being made for differences between man and dog, and for errors of observation, that voluntary action in the child arises and develops to perfection gradually, in connection with single functions separately, between about the fifth and ninth months; that the hand becomes first capable of voluntary use, and that its use occurs first in connection with stimulation through the eye.

Even with this very modest outcome, we find several interesting side-lights upon our results already arrived at in earlier connections.

1. Volition seems to come about the time of advent of suggestive reactions of the consciously imitative kind.

2. It arises first in connection with the sight-hand-movement reaction, a result which we have already had reason to anticipate. This seems to give some justification both to the use of the hand in connection with eye stimulations of colour, etc., in the 'dynamogenic method' of study which we have been pursuing, and also to the view that sight (with hearing) goes ahead of the other senses in stimulating to the higher co-ordinating processes of the organism. This means, in my jargon, that they are the avenues of greatest progress and attainment in the 'circular' form of reaction, the 'organic imitation,' by which accommodation comes about. So it is no accident that they are the most imitative of the senses, when imitation becomes conscious.

3. It is interesting to note that we found that the tendency to use the right hand more than the left began (allowing for the differences in children) about the sixth to the eighth month. Comparing this with the result given above, that the arm gets ready for voluntary use before any other member, and about the seventh month, it seems possible to surmise that one motor arm centre gets started before the other, and more vigorously,

in its preparation for voluntary action; and that the use of the right hand in preference to the left is evidence, at this first stage, of just this preparation going on in the left hemisphere. As the speech function follows this up pretty closely, beginning to be slightly voluntary in the shape of verbal imitations about the eighth or ninth month, the idea we had earlier, that voluntary speech proceeds upon an earlier predominant dextral function, gets, at any rate, no contradiction.[1]

VI. I need not take much space to point out, as a final piece of evidence, that the hypnotic condition shows a line drawn, in a most unmistakable way, just between imitation which is suggestion under the reign of habit, and imitation which involves accommodation and volition. The theory of hypnotism now most widely current, under the name of the 'suggestion theory,' amounts to a direct recognition of the fact that the somnambule is an abnormally good imitator. Spontaneity, synthesis, self-direction, these are gone; but these are volition. The somnambule never learns anything new. He is always satisfied with what he imitates. His critical attitudes, his criteria of belief, are all taken from him. The careful examination of the facts of hypnosis, with the view of volition now advanced, in mind, will convince any one, I think, that the line of division between suggestion and volition is where we have placed it.

And the limits of the somnambule's suggestibility show the way out of his dilemma very plainly; the way nature has

[1] It is interesting to know that both Soltmann found with young dogs and v. Gudden with a young rabbit, that the motor centre of one hemisphere may control both the right and the left limb in the first two months or more. Soltmann kept a young dog alive a number of weeks after its left fore leg centre had been removed, and succeeded in getting movements of both the fore paws by stimulating the proper centre in the right hemisphere. Such double contraction from stimulating one side failed with a grown dog, as it commonly does in other instances. Soltmann, *loc. cit.*, pp. 128–131.

actually taken in the development of the child and in the series of animal forms. When the suggested course comes into hard collision with the root-habits, sentiments, realities, of his nature, — his modesty, his veracity, his self-interests, — then he may be aroused to a kind of hesitation. He delays, avoids, perhaps refuses to act upon the suggestion. This reproduces exactly the condition in the child's consciousness which we have called 'deliberative suggestion.'[1] The child has to reconcile seeming irreconcilables, to violate his nature sometimes. And it is just in the stress of such issues among the suggestive influences that move him, that he gets the higher form of conscious plurality of motives which his volition goes out to unite in one.

§ 5. *Variations in the Rise of Volition: Self-imitation*

It is now time to ask whether the requisites to volition in the child may arise in another way than by the imitation of external movements, sounds, etc.

We find present, indeed, in the child certain congenital tendencies which have arisen in the process of development — tendencies to act in certain ways, to pursue certain classes of objects, to be satisfied with certain gratifications, and to urge himself toward them. The case of volition is not narrowed down, as would seem to be the case in the typical instance figured above,[2] which seems in effect to make the child ready for all suggestions which come, and equally ready for all. On the contrary, he has appetites, instincts, impulses; and it would not be surprising if we should find that these may precipitate him before the time into a certain unready choice or a certain conflict of choices.

Moreover, the principle of 'organic imitation' has shown

[1] Above, Chap. VI., § 3.

[2] Fig. XIV., p. 377.

us that the rise of memory and imagination is the direct outcome of the need which confronts the organism of meeting its stimulations halfway: the organism comes to reinstate within consciousness, on occasion, through the development of its central cortical processes, certain elements which we call memories, pictures, thoughts, without waiting for the stimulations outside. If it be true that memories and imaginations differ from perceptions only in the fact that they are 'away' from external nature and not dependent upon its present objects, then why may not all the motor consequences which were at first associated with the objects follow from the images simply?

If we put these two things together, namely, organized habits of action in particular ways, and the motor force of memories as prompting, by their dynamogenic influence, to the repetition of the reactions with which they themselves are joined — then we have the possibility of volition without overt imitation of external events, and possibly earlier than the time of the first such imitations, *i.e.* by self-imitation.

In certain instances clearly present in children, the facts are simple, and show three cases: either, first, the child simply remembers something and aims to imitate it; or, second, the synthesis or co-ordination demanded for volition is really present, as our scheme in Fig. XIV. demands, but one of the motor tendencies involved is a *special native tendency;* its stimulus is organic. And when a new stimulation comes to excite a movement in conflict with the one prescribed by nature, then there is all the complexity of volition. A subtle inner controversy arises and the child has to settle it, quite subconsciously perhaps, by a choice which is voluntary. Or third, both — all — the tendencies may be native, but one of them modified by experience, reflection, etc., into a partial conflict with others, so that effort arises in the solution of the case for action.

The first case may be illustrated by any volition aimed at a memory, and bringing out the movement which reinstates the sensations which the memory stands for. My child persistently reaching for a colour and then *moving nearer* to get it, illustrates this case; or H. dragging a table-cloth in her seventh month to bring my bunch of keys within reach. She remembers the movements necessary and makes them voluntarily for an end — movements she had before found out by accident, or had seen some one else make. She strives to reproduce the sensations of movement and with them the touch of the keys by just the circular process of imitation, except that it starts in the memory centre instead of in eye or ear.

The second case has interesting illustrations too: a conflict brought about between a native impelling instinct on one hand, and a suggested course on the other. Many direct modifications of instinct arise in this way, the inhibition of sobbing and crying, the self-denial of not reaching for attractive things, all responses, to parent or companion, which conflict with spontaneous tendency, and then consciously master it. These are voluntary, in the transition sense, just in so far as there is motor duality or conflict, resolved consciously and by effort into a motor unity, which effects a repetition of the one reaction or the other.

And still more deep-going is the third class of these so-called, in our developmental phraseology, 'phylogenetic imitations,' which show the clash of nature against itself. We have seen the lower form of it in 'deliberative suggestion';[1] suggestion locking horns with suggestion, and then — the outcome, to tell us which is victorious. A corresponding state of things

[1] Above, Chap. VI., § 3.

occurs on a higher scale, at the cortical level, when we feel two alternatives so strongly and consent to one of them, by seeming to ourselves *not* to choose it at all. It simply chooses itself, and we stand and wonder. So the child often acts voluntarily when it is practically blind to pros and cons, when the whole complex condition is made up of elements so characteristic and strenuous for utterance, that allowance or recognition is all he has to do. The child's early moral decisions are of this kind, I think. The ought, the right, simply represents a growing habit, his nature coming to feel what it ought to be by what it is getting to be, in the midst of crying imperative appetites and suggestions. He acts voluntarily for the right, let us say; but who can say that his choice is in every case in any real sense intended beforehand?

It is interesting to note, further, under this head, an instance of what is to be spoken of again as the 'interaction of habit and accommodation.' We find volition brought out on occasion of imitation, a higher kind of imitation called 'persistent,' in which the child does not rest content with the degree of success his old reactions provide, but aims 'to try again' for better things. Now the imitative instinct itself is thus, in this transition, brought to the bar, and violated by its own passage into volition. In volition, the agency of the actor comes to instruct him. He learns his power to resist and to conquer, as well as his weakness and subjection to a copy. And the child comes, just in this conflict between imitation, an instinct, and suggestion, an innovation, to break through and make himself an inventor, and a free agent. In fact, we have found a type of action realized in the phrase 'contrary' or 'wayward' suggestion, in which just this revolt becomes a way of action. The boy *won't* imitate. This simply means that he won't imitate what other people ask him to, but prefers to imitate what he asks himself to.

He imitates just the same, of course. But the difference is world-wide. Such a 'contrary' boy has learned the lesson of volition, has passed from suggestion to conduct, has mounted from the second to the third level, and is available for genius-material.[1]

I have said enough now to show that the rise of volition is but another illustration of the one law of motor development. It is the form that the process of accommodation takes on when the central processes become complex.

[1] The great question of invention *versus* imitation — how can any one be original if even volition and thought be imitative functions? — is treated in Chaps. III.–V., of the later volume, *Social and Ethical Interpretations.*

CHAPTER XIV

The Mechanism of Revival: Internal Speech and Song

The facts of memory and imagination, now broadly discussed, are capable of closer description, when we come to the analysis of consciousness itself. Each function which has its external habit-aspect in the action of the person, has also its internal habit-aspect in the movements among the elements of content in the mind, which go to make up our 'stream of thought.' A 'cross-section' of the stream at any moment will contain the elements in consciousness which stand for the activities going on, or tending to go on, in the bodily mechanism. And each such element must have its reason for being in the laws of assimilation, association, and thought, already briefly put in evidence.

I shall attempt to show this in more detail by analyzing two so-called 'expressive' functions, both of which are most interesting in themselves, and both of which have had great light thrown upon them in later years: speech and song. The aim shall be, not to give detailed descriptions of the execution of speech and music, but to show what is actually in consciousness at the time of any such execution, and how just this came to be in consciousness.

§ 1. *Internal Speech: How do we think of Words?*

An important advance has been made in late years in the purely psychological doctrine of memory and imagination.

The old psychology held that all individuals were alike as regards the brain centres for the memory of particular things and for the performance of particular actions. It has been shown, however, by pathological cases and by analysis as well, that we are not alike. Several distinct so-called 'types' have been discovered — persons who depend mainly on one sense for their memories, and on the memories of this sense mainly for the necessary release of voluntary energy into the muscular combinations used in performing particular actions. The analysis of the speech function has been so brilliant, that I may explain it more in detail, as illustrating the general principle of 'types,' upon which, as I think, the true theory of the rise and development of attention must be based.

The doctrine of brain function in speech is now pretty clear — thanks to the teaching, principally, of pathological cases. Normal speech is a function which probably involves several so-called 'brain centres,' all in dynamic connection with one another. Given a man with the physical apparatus of the act of speaking intact — vocal organs, nerve connections, and brain seat of discharge (Broca's gyre) — and ask why such a man speaks, the answer may take several forms. He may name a word sign which he has *seen*, or repeat a word sound which he has *heard*, or tell the words he has *written*, or finally, he may speak a word simply from the *habit* of speaking it — from the tendency of his speech apparatus to operate as it has operated before. Now we ordinarily generalize this diversity in the case in which the man 'thinks' the word merely, without speaking it, by saying that the word is 'in his mind,' internal, *intérieur;* but the question is: What is in his mind? — the printed word (visual image), the spoken word (auditory), the written word (hand-motor), the articulate word (speech-motor) — is it all of these? Is it any of them?

If we agree to call the motor centre for speech (*mp* of Fig. XVII., b, above) the 'intrinsic' seat of stimulation to the organs of speech, and, on the other hand, to call the other centres pointed out 'extrinsic,' the question now current runs: Are these extrinsic centres capable, each for itself, of arousing the speech centre; or does one of them, the centre for sensations and memories of actual movement, the 'kinæsthetic' word centre (*mc*, of the same figure), always stand between the motor seat and the other sensory centres?

Or, put psychologically, do we, when we remember words and speak them, always recall them in terms of the sensations of movement involved in speaking or writing them; or is it possible to speak simply from remembering the visual form of the word, or its sound? Is the kinæsthetic centre, with the memories of movement to which its processes correspond, intrinsic or extrinsic?

The view that verbal memories are always motor, or kinæsthetic, is associated with the name of Stricker.[1] Recent results have refuted Stricker. A variety of facts have been adduced to show that the function of speech is not dependent in all cases upon the possibility of reinstating motor experiences; although in some cases it is, for patients are reported who could not speak unless they first traced the words with hand or pen.[2] Many of these facts are already common property; but a few of the recent points on this side of the discussion are these: (1) Cases are cited of verbal hallucination, in which the patient hears two or more voices, one of which he takes to be his own, the other that of some one

[1] Stricker, *Ueber die Bewegungsvorstellungen, Ueber die Association der Vorstellungen, Ueber die Sprachvorstellungen, Langage et Musique.* See also G. E. Müller, *Grundlegung der Psychophysik.*

[2] See Sommer's report on the so-called Grashey case — a patient named Voit — in *Zeitsch. für Psychologie,* II., Heft 3, p. 158, and the citations of Pick, same journal, III., Heft 1, p. 50.

else; only the former can be accounted for as due to the incipient stimulation of his own speech centres, the other is probably auditory.[1] This interpretation is supported by the interesting fact, established by Pierre Janet, that some patients can themselves speak during their verbal hallucinations, while others cannot. Again, only of the latter class must we hold that the motor memories are necessary to speech.[2] Indeed, there is a characteristic difference between the two classes, — a difference first pointed out, it seems, by Baillarger — *i.e.* with those patients who are able to speak without interrupting the voice which they hear, we have a hallucination of *objective* speech: they hear what they think is a real voice outside them. While the other class have a hallucination of *internal* speech. They declare that there is some one inside them, speaking to them. Séglas holds, with evident truth, that these latter hallucinations are 'psycho-motor'[3] in their seat, while the 'objective' kind are auditory. (2) There are cases of aphasia due to impairment of hearing, the motor centres being intact, *i.e.* cases of auditory verbal amnesic aphasia.[4] (3) We recognize and understand words which we are unable to pronounce, and which we have never written; this recognition must be by aid of visual or auditory images. The part played by the visual and motor memories respectively, in my own case, is seen in the fact that when I

[1] See case of Charcot quoted by Ballet, *Le langage intérieur*, p. 64, also cases in Séglas, *Les troubles du langage chez les aliénés*, p. 126.

[2] Cf. *Revue Philosophique*, November, 1892, p. 520, and Séglas, *loc. cit.*, p. 117 and p. 145. A case is reported of a patient who could stop his internal voice by holding his breath (*Annales Psychol.*, January, 1893, p. 103).

[3] Séglas, *loc. cit.*, p. 147; Janet, *loc. cit.*, who advocates the expression 'kinæsthetic verbal' instead of 'psycho-motor,' as applying to this hallucination of internal speech.

[4] See cases collected by Ballet, *loc. cit.*, pp. 91–92; also Bastian's case, *Brain as Organ of Mind*, p. 642; cf. also Paulhan, *Revue Philosophique*, XXI., pp. 37 ff.

wish to speak in any language but English, the German words come first into my mind; but when I sit down to write in a foreign language, French words invariably present themselves. This means that my German is speech-motor and auditory, having been learned conversationally in Germany, while the French, which was acquired in school by reading and exercise-writing, is visual and hand-motor.[1] It is interesting also to note the joyous recognition which young children show, when they speak a new vowel or consonant sound correctly. The memory of the correct sound cannot, in this case evidently, be from the motor centres.[2] (4) There is evidence of direct functional connection between the visual and auditory seats respectively, and the centre of motor discharge. Here I may best give the words of Janet, who writes in view of the pathological evidence: "This hypothesis is confirmed by investigations on anæsthetic hysterics. In my opinion, it is impossible to explain the fact that these persons preserve their power of movement intact, in spite of the absolute loss of kinæsthetic sensations and images, unless we admit that movement may be directly stimulated by visual and auditory pictures. There are individuals with whom the auditory image of a word suffices for its pronunciation."[3] (5) The law of 'dynamogenesis,' in accordance

[1] A similar case, apart from details, is reported by Ballet, *loc. cit.*, p. 62.

[2] At the risk of too much personality (of which, however, the literature of this topic is necessarily full), I may quote the following about my two-year-old child H., written by her aunt, Miss E. L. Baldwin: "She rejoices greatly when she succeeds in sounding a new letter. The other day she achieved *l*, and went about telling everybody, 'Baby can say sleep and slipper.' This morning I am informed that she can say 'save' and 'give' (letter *v*). She notices at once herself, when she can pronounce the word as the rest of us do — no one tells her."

[3] Pierre Janet, *Automatisme Psychologique*, p. 60. The common cases of patients who can *copy*, when they cannot *initiate* writing and speech, are in evidence.

with which every sensory stimulation tends to bring about a motor discharge, indicates such a direct connection in cases of closely associated function. Féré demonstrates that speaking makes the hand-grasp stronger, that seeing colours and hearing sounds influence the motor centres; so it is altogether probable that stimulations of sight and hearing react directly to stimulate the motor speech centres.[1] (6) Cases may be cited of direct antagonism between memories of words and the sensations produced by the speech movements which they stimulate. The pathological state called paraphasia[2] is duplicated sometimes temporarily in cases of severe headache; one intends to mention one object (chair) and really speaks another (spoon), without detecting the mistake. I have myself had this experience; being quite unable to name correctly an object seen, until some one else has spoken the word with emphasis — yet all the while allowing my own incorrect word to pass, and feeling astonishment that others have not understood my meaning. Similar are those cases in which patients take their own words for those of some one else, declaring, when questioned, that they themselves did not speak them.[3] Reflection leads us to the view that in these cases there is a direct flow from the auditory or visual centre to the motor speech centre, the kinæsthetic speech centre being, perhaps, temporarily inhibited. The same kind of antagonism is also seen, from the other side, when there is 'exaltation' of the kinæsthetic centre, or what is

[1] Féré cites his results in support of Stricker's contention; see his *Sensation et Mouvement*. He fails, however, to distinguish between the direct motor effect of a sensation, and the indirect motor effect — *i.e.* through the kinæsthetic centre, or *via* the motor correlations which the attention requires — this indirect effect being required by Stricker's view.

[2] Cf. Bastian's cases of 'inco-ordinate amnesia,' *Brain as Organ of Mind*, pp. 634–638.

[3] See Séglas' very interesting cases, *loc. cit.*, pp. 150 f.

called uncontrollable 'verbal impulse.' The patient speaks certain words or phrases in spite of himself — against his utmost effort to speak something else.[1]

This conception of the case — not to dwell upon other points of evidence[2] — seems to harmonize well with the doctrine of nervous function now becoming more and more current. According to this doctrine, the brain is a series of centres of only relatively stable tension; the various associative connections among these centres are paths of *less and more*, rather than of *least and most*, resistance; the range of alternative adjustments is excessively wide; and, consequently, any individual has his 'personal equation' in all functions as complex as that of speech. One man is a 'motor,' another a 'visual,' a third an 'auditive,' according as one or another of the extrinsic sources of stimulation suffices to release the necessary energy into his motor speech centre. No one doubts Stricker, therefore, when he says

[1] See Séglas on 'hysterical mutism,' *loc. cit.*, pp. 97 f. In dreams this is probably the case: the kinæsthetic centres are no longer inhibited, and we talk meaningless sounds, which in our dream consciousness are interpreted, as rational discourse. In view of all such cases of antagonism, I suggested in an earlier statement of the main considerations on this point (*Philos. Review*, II., 1893, p. 389), that a distinction was legitimate between *psychic* and *cortical dumbness*, corresponding to the current distinction on the sensory side. Just as there is a distinction between being unable to hear words (cortical deafness), and being unable to understand the *meanings* of words we hear (psychic deafness), so there is a distinction, shown pathologically, between being unable to speak words, and being unable to speak the words we *mean*. Put in different terminology, the former case would be due to a lesion of the motor elements at the 'second level,' and the latter case to a lesion of the motor connections between the second and the cortical or 'third level.' Compare the allusions made to these differences above, Chap. XIII., § 3, p. 387.

[2] For instance, cf. Stumpf, *Tonpsychologie*, I., pp. 160 ff. Further evidence accrues, also, from the consideration of tune memories, which seem to be independent, in many adults, and generally in children, of the singing or playing of the tunes. Cf. above, Chap. VI., § 5, and the next section of this chapter.

that he remembers words only by means of sensations of incipient movement; but for the same reason we cannot dispute the claim of Stumpf, and Wernicke, and Kussmaul, and Lichtheim, that auditory and visual images may, in other cases, play an equally leading rôle.

§ 2. *Internal Song: How do we think of Tunes?*

The question of 'internal song' is a newer one. What do we mean when we say that a 'tune is running in our head'? What sort of images are really in consciousness then?

The factors involved are evidently less complex than those already shown to be involved in speech memory, in the discussion in the preceding paragraph, at the same time that the entire phenomenon is more obscure. Evidence goes to show that the internal tune is almost entirely auditory: that is, that the auditory centre is intrinsic to musical reproduction.

An adequate discussion of the nature of tune reproduction should provide a theory of tune perception which takes account of three factors — pitch, time or rhythm, timbre — and possibly of a fourth character, ordinarily designated by the phrase 'musical expression,' or, more properly, emotional tone.[1]

[1] There is not a great deal of literature on this topic: see the following titles: Egger, *La parole intérieure;* Stricker, *Langage et musique;* Stumpf, *Tonpsychologie,* I., pp. 135 ff.; Wallaschek, *Vierteljahrschrift für Musikwissenschaft,* 1891, Heft 1, and 'Die Bedeutung der Aphasia für die Musikvorstellung,' *Zeitsch. für Psychol.,* VI., Heft 1, and his review of my theory in the same journal, VII., Heft 1; Wallaschek has a popular article also in the *Contemporary Review,* September, 1894; Lotze, *Medicinische Psychologie,* p. 480; G. E. Müller, *Grundlegung der Psychophysik,* p. 288; v. Franckl-Hochwart, 'Ueber den Verlust der musikalischen Ausdruckvermögens' in *Deutsche Zeitschrift für Nervenheilkunde,* 1891, I., pp. 283–291; Oppenheim,

There are certain interesting points of relationship between the process of internal speech and that of 'internal' or remembered music. For example, many persons find internal tunes generally fuller, more real, and sometimes only tunes at all when vocal movements are involved; either, that is, when they remember the appropriate words, when they have sung the words to the tune, or when they have hummed the refrain aloud. Here there is clearly a motor type of music performers. But this motor requirement is extremely variable. In some cases the tune must be associated with a particular instrument, and this is done only by the reproduction of the proper sensations in the finger tips, lips, etc., used in playing that instrument. On the other hand, there are facts which show that the motor type is only a type, and that even in these cases auditory tune memories are necessary. Musical recognition in childhood often precedes verbal recognition. Musical expression usually precedes verbal expression, both when there is a clearly inherited musical tendency,[1] and in ordinary imitative reactions.[2] In case of 'absolute hearing,' discussed below, we have apparently recognition of pitch without any motor speech or song images. Further, there is the critical fact that motor aphasia, and even verbal deafness, may exist with no impairment of the musical faculty — no *amusia*, as defects of musical faculty are called by Brazier. This is true both for musical recognition (case of Wernicke), and for musical expression.[3] Cases show, how-

Charité Annalen, XIII., 1888, 345–383; besides the voluminous literature of aphasia. An interesting late article, full of bibliographical references, is by Brazier, *Revue Philosophique*, October, 1892, p. 337. For later citations, see the appropriate topics in the writer's *Dict. of Philos. and Psychology*.

[1] Interesting cases are cited by Ballet, *loc. cit.*, p. 24.

[2] My child E. imitated a run of three notes, vocally, before she showed any verbal imitations.

[3] Cf. v. Franckl-Hochwart, *loc. cit.*, I., p. 283.

ever, that the latter, musical expression, is never lost, without involving speech; although musical recognition seems sometimes, as in Carpenter's case and in Brazier's cases of musical amnesia, to be lost without impairing speech.[1] The conclusion that musical reproduction is auditory is supported also by such facts as the following: that we often recognize an air after hearing it once, even when we have never tried to sing it, and could not if we tried; that in singing or humming a tune, we know that we are wrong even when we are unable to correct it; tune hallucinations without words or vocal quality are reported, and illusions of tunes may be started by accidental sounds;[2] many persons are able to remember and recall musical chords and combinations which it is impossible for the human voice to reproduce, *i.e.* we can mentally depict harmony; further, there are cases of persons who can recognize the pitch of tones from instruments, but not that of the tones of their own voice.[3] It seems clear, indeed, on the surface, that of the elements distinguished above as essential to musical reproduction — pitch, rhythm, timbre, and emotional tone — the most essential, pitch, finds no adequate basis in motor speech or song memories. The range of intonation in speaking and singing is too narrow to supply the material for musical reproduction, although there are, no doubt, individuals whose musical capacity — especially of expression — is confined to these limits.

It is probable, accordingly, that there is a brain-centre for

[1] Wallaschek, *Zt. f. Psych.*, VII., March, 1893, p. 671, in criticising this statement of mine, cites cases of musical inability through stage-fright, while speech remains, as possible exceptions. I think, however, that stage-fright is such an emotional and *interested* thing that the inability is not really musical at all, but is rather due to general nervous inhibition.

[2] Ordinary internal tunes are usually stimulated in this way, as I have said above, Chap. VI., § 5.

[3] Cases of v. Kries cited below.

tune memories — a centre whose impairment produces so-called *notal amusia* — that this centre is a part, in function, at least, if not anatomically, of the auditory centre, and that cases will occur of partial amusia in different persons, due to the degree in which this function involves others.[1] This general conclusion is confirmed, I think, by what follows on pitch memory, the only one of the four elements of musical reproduction which is in order here.

§ 3. *Pitch Recognition: How do we know Notes?*

The recognition of the pitch of notes gives two cases apparently distinct from each other, *i.e.* 'relative' and 'absolute' pitch recognition. In relative recognition the musical interval seems to supply the real *locus* of the recognition. Given the initial note and the proper rhythm — and the rest of the tune comes up by reason of the associated tone intervals, note by note. It is the case of objective recognition by assimilation of content, as already described.[2] Comparatively few persons lack the ability to carry through a familiar tune mentally. Absolute recognition, on the other hand, is a different accomplishment; even among competent musicians it is often[3] conspicuously absent. It is the power of reproducing a note of any desired pitch absolutely from memory.

[1] For example, musical deafness without verbal deafness; case of Grant Allen in *Mind*, III., p. 157, and that of Brazier, *loc. cit.*, p. 359. Bastian, *loc. cit.*, p. 664, quotes a case from Lasègue of an aphasic musician, who could write nothing but passages of music which he had *just heard*. A recent case of Pick's (*Archiv für Psych.*, 1892, p. 910) seems at first sight to give trouble, *i.e.* a case of loss of musical *recognition* with no impairment of musical *expression*. Yet Pick's location of the lesion as *subcortical* sufficiently accords with the view in the text. The seat of auditory *attention* was not injured. Cf. note on Pick's position, and the theory of 'muscular control,' below, Chap. XV., § 4.

[2] Chap. X., § 3.

[3] In the case of some of those who carry tuning-forks in their pockets.

The auditory character of all relative pitch recognition is shown by the following facts — in addition to the general considerations already adduced: (1) Brazier [1] cites cases of aphasic patients who could speak words only by singing them: that is, they must first recognize an air, and then arouse the motor speech function from that cue. The motor centre not being available in these cases, it is difficult to see on what but auditory grounds the tune recognition could proceed. It often occurs, in my own case, that I cannot recall the words of a song until I get the tune started. Another case of this kind is cited immediately below. (2) I find it possible, with Paulhan,[2] to think different notes very clearly while the vocal organs are held rigid. I am able to think one note while I am uttering aloud a long-drawn-out vocal sound, say *ā*, in a different pitch. And lest it may be said that it is the overtones which are heard internally in this case, I may add, that I am able with the greatest ease to hold aloud an *ā* sound at c′, say, and at the same time to cause a whole tune — say Yankee-doodle — to run its course 'in my ear.' Stricker's inability to think one consonant while speaking another is due, probably, to the fact that, in uttering labials, etc., pronounced and explosive muscular combinations are necessary, and that they have no clear auditory character, being usually merged in accompanying vowel sounds. (3) My internal tunes have very decided pitch — determined upon an instrument in a number of cases. Yet, as I have said above, it is not always the normal pitch of the tune as written and learned, nor is it constant for recurrences of the same tune.

In explaining pitch recognition the question of relative pitch comes first. The very fact that it is relative, means that it may be brought under the law of objective conscious recog-

[1] *Loc. cit.*, p. 366. [2] *Loc. cit.*

nition in general. If recognition be due to assimilation, relationship, 'fringe,' in the representation recognized, and vary with the degree of this associative of apperceptive element, then recognition of each note would occur, like the recognition of any other presented content, according as it have or have not a train or fringe of associated elements. A tune is then recognized, because it is such a train. The degree of precision in its recognition depends upon the fineness of discrimination at the original hearing of it. So also the fact that notes are better recognized after the musical notation has been learned, simply means that additional elements are brought into the complex by the notation — elements which support the claim of the whole. With persons of the motor type, further, the motor speech and song images are prominent in this complex, and so essential, in some cases, that recognition does not occur without them. It seems likely, therefore, that if we grant differences of pitch in tone sensations, the recognition of the associated trains which we call 'tunes' is but an instance of a broader mental phenomenon.

Absolute recognition, on the other hand, or 'absolute hearing,' as it is called, presents anomalies which make it difficult to explain it as an ordinary case of recognition by presented association. Either we must find elements of complexity in such tones or confess that here is an exception to the accepted theory. I have already given the general principles by which this case is to be explained: but it may be well to apply them now to a concrete instance.[1] The question which may be asked is this: Can any one identify a note of any pitch simply and only from the tone-quality of the note itself?

One of the latest contributions to this question is from

[1] See above, Chap. X., § 3.

v. Kries,[1] who is himself a musician. He possesses the so-called absolute hearing. He also publishes details supplied from other similar cases. He argues that the ability to identify a single isolated note cannot be due to musical practice, *i.e.* cannot be a refinement of interval recognition,[2] because (1) he has had this power from early boyhood, as also have others whom he cites; (2) some of the most celebrated musicians have not been able to acquire it at all, although their sense of interval became wonderfully acute; and (3) the power in himself and others varies with the instrument which sounds the note, and is not best with the instruments most used. He recognizes notes from the piano best, also from string and wind instruments, especially the violin, but not those from tuning-forks, or steam and other whistles, or notes sung or whistled with the lips — a state of things shown with some variations also in several of his correspondents. Now the violin is with v. Kries a late accomplishment, while he has, of course, been hearing singing all his life, accompanying singers on the piano from his twelfth year, and whistling habitually. Indeed, these last facts — showing the influence of timbre on pitch recognition — lead him to deny that there are any revived images of any kind belonging intrinsically to musical recognition. He finds it to be a case of the 'association by naming' as established by Lehmann; that is, v. Kries was not able to recognize notes until after, in boyhood, he had learned their *names and written signs*. The case is analogous, therefore, he holds, to the recognitions which Lehmann found to follow from the simple lettering and naming of shades of wool not before separately recognized.

This conclusion of v. Kries is lame, I think. It does not

[1] 'Das absolute Gehör,' in *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, III., 192, p. 257.

[2] So Stumpf, *loc. cit.*, I., p. 280.

account for the differences due to timbre mentioned above; for the notation is the same practically for all the instruments and for the voice. v. Kries admits this, and says it remains for the future to provide a theory of this influence due to timbre — leaning, however, as he does, to the overtone theory. Further, he agrees with other observers in finding that chords are better recognized than single notes; this would indicate that recognition is due in some way to the complexity and variety of the tone content, rather than to the accident of naming. It is possible, perhaps, to give due weight to the influence of the name association in a theory which does more justice to the essential facts. This and other cases of the recognition of apparently isolated sense qualities can be brought, I think, under the law of 'sensori-motor association' made out above,[1] according to which the recognition is due simply to the modification of the α element in the formula of attention, *i.e.* to the relative ease of adjustment of the attention to one particular tone-pitch as such.

Several considerations may be urged in favour of this view: (1) It brings absolute and relative tone recognition under a single principle; the former arises on the motor side, the latter on the sensory, or content side, of the one process; (2) it accounts for the greater relative ease of recognition of chords and compound tones; apart from their complexity of content, they carry greater and more varied dynamogenic influence; (3) it makes it possible to consider tone recognition in some cases hereditary, as the facts (*i.e.* cases of v. Kries and others) seem to require; persons have from birth a tendency to give the attention with greater facility to one class of stimulations than to another — so the doctrine of

[1] Chap. X., § 3. Instead of Höffding's sentence (*Phil. Stud.*, VIII., p. 90), '*die organische Functionen gehen leichter*' in absolute recognition, I should say, the psycho-physical function of attention 'goes easier.'

types teaches. Why may not this difference extend also to different notes? The analysis given above of the speech function leads us to see what refinements are possible in the recognition of words. Even the recognition of particular classes of words, as nouns, may be lost while other words are correctly used. Brazier cites a case in which the visual time notation of written music was retained while the pitch notation in the same music was lost. A corresponding native refinement on the motor side, *i.e.* in the attention, is all that this theory requires, that is, if we are right in considering the attention to involve refined motor adjustments. Refinements on the sensory side, as seen in association, are dependent, indeed, upon refinements on the motor side. The variations in motor reactions are the winnowing, selecting agents in all mental progress; (4) it enables us to explain the apparent influence of timbre, a fact not explained by any other theory. The fact that isolated tones from some instruments are recognized, while from others they are not, I hold to arise from differences in the type of attention exerted in the several cases respectively. A 'visual' musician is most likely to recognize tones from instruments whose manipulation or notation involves much visual attention; an 'auditive,' notes from those which exercise hearing in most varied and exclusive ways; and a 'motor,' notes from those in connection with which muscular attention is at its best. It is remarkable that in all of v. Kries's recognitions, the method of learning is probably by visual note-reading, — piano, violin, etc., — while his non-recognitions — his own voice, voice of others, steam whistles, lip-whistling, etc. — are apparently in cases in which the essential indications do not include such systematic visual attention. Now on the supposition that v. Kries is a 'visual,' *i.e.* that the pitch elements of the attention in his case are most readily stimulated from the centre for sight, we have a clear application of our law.[1] Further, v. Kries was unable to recognize tones before he learned musical notation, which, it is natural to suppose, was at first visual. The case of musical alexia already quoted from Brazier shows the importance of a single class of notation memories, although that case involved the loss, not of tone recognition, but of musical execution;[2] (5) one of v. Kries's cases of 'absolute hearing' seems to be, from what he reports of it, motor in type: a young woman who recognized tones when sung only by means of 'internal repetition,' to herself, of the notes sung (*das Bedürfniss bestand, sie innerlich nachzusingen*).[3] This *innerliches Nachsingen*, in a case where the real note is already heard, is probably motor, a supposition supported by the fact that the woman was a 'skilful singer herself.' Her quicker recognition of piano tones might be because of the motor practice in hand execution; (6) this point of view affords us an additional reason for the fact, which all admit, that the best recognitions are for notes of moderate pitch, — not very high or very low; for, being of most frequent occurrence, these notes exercise the attention most, and so get most easily and readily accommodated to. And it is also easy to see that, for this reason, their discrimination becomes finer and better; (7) in the experiments already referred to, Féré found different dynamogenic effects to follow the hearing of the different notes of the musical scale, and the greatest effect to follow the notes in the middle of the gamut; if true, this is nothing short of a demonstration of variations in the α element in attention, for different pitches.

Finally, if 'motor associates' be at the bottom of pure-

[1] Of course, such an application is only an illustration; the details of the individual's life and education — the questions 'why?' and 'to what extent? he is visual, motor, etc. — make any single case extremely complex.

[2] *Loc. cit.*, p. 363.

[3] *Loc. cit.*, p. 273.

tone recognition, we would expect something of the same kind in the case of colour and odour qualities. This is the sphere of Lehmann's results in *Benennungsassociation* to which v. Kries appeals. Now Féré claims to have demonstrated this point also, *i.e.* that colour discrimination and recognition are improved by muscular exercise. He found it possible to bring back purple recognition to purple-blind hysterics, simply by muscular movement. It is a ready deduction, also, from the opposite fact that the different colours, beginning with red, have diminishing dynamogenic effect as measured on the squeeze-dynamometer.

The details now cited, in the case of speech and tune revival, may be taken as detailed examples of the application of the general theory of assimilation to detailed instances. The position of the theory as regards recognition of tones may be stated in the words of James, quoted from his review of my earlier article: "It offers a basis of mediation between the two theories of Recognition over which Höffding and Lehmann have recently waged war. One theory, stated in its radical form, says that a thing looks familiar to us when it recalls to us its past *self*. The other theory says it looks or sounds familiar when it recalls its past *surroundings*. The difficulty with the latter view is, that the supposed surroundings fail to become explicitly conscious when the recognition is confined to the bare 'sense of familiarity.' How do we know, then, that they are at all tending to revive? But Professor Baldwin, in making them sink to the level of mere motor associates of former acts of attention, gives a good reason why our consciousness of them should be so indistinct, and why at the same time we should so unmistakably greet the sensory experience which they accompany as one already ours." [1]

[1] *The Psychological Review*, I., 1894, p. 210.

An informal criticism by Professor Höffding is answered in another place.[1] Wallaschek[2] objects to my view, that as all persons have the requisite factors, all should have absolute tone recognition. But the reason they do not is, I think, not a fault of their reproduction, but of their perception. Some cannot recognize tones again, because they do not clearly distinguish them in the first instance. All possible variations, from the best to the poorest discrimination of tones, would give corresponding variations in the facility of recognition.

It may be well to note, finally, that one among the minor questions to which this theory of sensori-motor association suggests answers, is that of so-called 'paramnesia,'—the false recognition of new localities, interiors, etc., the sense that an event has happened to one before. It may be due to the artificial or accidental stirring up of an old *attention series*. Any new experience which gives approximately the same strains, etc., in the attention complex, as an earlier experience, would seem *familiar*, at the same time that it might not be nor seem *objectively identical*.

[1] See Chap. XV., § 4, footnote.

[2] *Zt. für Psych.*, VII., March, 1894, p. 68.

CHAPTER XV

The Origin of Attention

§ 1. *Voluntary Attention*

The foregoing examination of current theories of development has served to throw into relief the elements of the problem. It has also shown that a theory of adaptation must have reference to the repetition of stimulations, fundamentally, not of movements; the theory developed above — based as it is upon the work of Darwin and Spencer — is consciously drawn to supply this want.

The three psychological stages or levels at which we find consciousness getting new accommodations have already been pointed out,[1] and the claim made that the 'law of excess,' enunciated above, applies to each and all of them. We have already considered the two lower stages and now come to the third. The question is now, accordingly, How is the conscious person able to perform a new movement voluntarily and with attention?

The first remark is this: To make any movement voluntarily, the attention must be fixed upon some kind of an idea which represents this movement. I do not care to repeat the analysis which I have published elsewhere,[2] and which James has also made, much more forcibly,[3] of volition back to its last citadel — voluntary attention to an idea. Everybody, it seems, now admits it. If the object of volition, then, is a

[1] Above, Chap. VII., § 1, *ad fin.* [2] *Handbook*, II., Chaps. XII., XV.
[3] *Princ. of Psychology*, Vol. I., Chap. XI.

movement, an idea that *means the movement* must be attended to.

But in the case of learning a thing for the first time the movement required is not an old, but a new one:[1] hence it cannot be a mental image or memory of the movement, to which the attention is directed; it must be an external movement or event, of some kind, which yet in some way manages to send its dynamogenic influence into the motor channels required.

Now to acquire a movement seen, or in some other way externally set up, — this is exactly conscious imitation. The problem then reduces itself to the process of persistent effortful imitation; and we have to ask how attention to a movement seen, for example, enables the child or man to come to perform this movement himself.

The process of persistent imitation, as far as its mechanism is concerned, has been depicted and figured above.[2] The point essential to our present topic has also been casually mentioned, *i.e.* that the difference between 'simple' and 'persistent' imitation of the try-try-again type, is that, in the former, an earlier muscular movement is repeated without variation, while in the latter, the earlier movement is modified in such a way as to approximate, more and more closely, the movement-copy attended to.

In persistent imitation the first reaction is not repeated.

[1] Unless, indeed, it has been accidentally performed before. It may be admitted that many useful acts are acquired by such happy accident, and one may say that the 'excess' discharge is of use largely in increasing such happy hits. But no one will deny that the 'hits' occur mainly through the child's imitations in cases of complex action, such as speech, writing, sewing, etc. It has been shown, however, that the former movement must have been innervated from the centre (that is, produced by the person himself), not merely mechanically produced. Cf. Bair in *Psych. Review*, VIII., 1901, p. 474.

[2] Chap. XIII., § 2.

Hence we must suppose the development of a function of co-ordination by which the two regions excited respectively by *the original suggestion and the reaction first made, coalesce in a common more voluminous and intense stimulation of the motor centre.* A movement is thus produced which, by reason of its greater mass and diffusion, includes more of the elements of the movement seen and copied. This is again reported by eye or ear, giving a new excitement, which is again co-ordinated with the original stimulation and with the after-effects of the earlier imitations. The result is yet another motor stimulation, or effort, of still greater mass and diffusion, which includes yet more elements of the 'copy.' And so on, *until simply by its increased mass, including the motor excitement of attention itself,* — by the greater range and variety of the motor elements thus innervated, — in short, by the *excess discharge,* the 'copy' is completely reproduced. The effort thus succeeds. (See Fig. XIV., above.)

This, it is evident, is the principle of 'motor excess,' and it is natural to find in it the origin of the attention. The attention is the mental function corresponding to the habitual motor co-ordination of the processes of heightened or 'excess' discharge. The exact elements which it includes have already been pointed out, and they will be spoken of again.

Let the child once withdraw attention from his copy, let him be distracted by bird or beast, and woe to his chance of learning the new movement. The whole conglomerate conscious content falls to pieces and he goes back to be a creature of suggestion. But let him keep on attending — strongly, faithfully, well — and note his actions. His whole physical personality gets concentrated in conjoint, then allied, then unified, then convulsive discharge upon the member which, by habit or previous use, is nearest to the copy requirement.

He rolls his tongue, bites his lip, sways his body, works his legs, winks his eyes, etc., until every scheming nerve and tendon bends to do the task. His blood-vessels, even, fill toward the hand he works with. This *occurs only in attention*, and this is the excess wave by which here in the highest consciousness, as there in the lowest organism, *accommodation to new stimulations is secured.*[1]

A direct examination of the infant's earliest voluntary movements shows the growth in mass, diffusion, and lack of precision which this theory requires. In acquiring the associations of elements involved in successful handwriting,[2] the young child uses hand, then hand and arm, then hand, arm, tongue, face, and finally his whole body. In speaking, also, he 'mouths' his sounds, screws his tongue and hands, etc. And he only gets his movements reduced to order after they have become by effort massive and diffuse. I find no support whatever in the children themselves, for the current view of psychologists, *i.e.* that voluntary combinations are gradually built up by adding up earlier voluntary movements, muscle to muscle, and group to group. This is true only after each of these elements has itself become voluntary. Such a view implies that the infant, at this stage, has a kind of separate consciousness of the different muscles, including those which he has never learned to use, which is false; and is able to avail himself of muscles which he has not learned to use, which is equally false — not to allude to the fact that it leaves suspended in mid-air the problem as to how the new combination, intended and dwelt upon by attention, or *no longer held in the attention*,[3] gets itself actually carried out, in the muscles.

[1] A similar view may now be found in Professor Lloyd Morgan's *Habit and Instinct*, p. 162.

[2] See the details given above, Chap. V., § 2.

[3] This is in brief the answer to the criticism made by some (*e.g.* Royce) that the theory gives no positive inhibition of the elements that are not selected.

When muscular effort thus succeeds, by the simple fact of increased mass and diffusion of reaction, the useless elements fall away because they have no emphasis.[1] The correct elements are, on the contrary, reinforced by their agreement with the 'copy', by the dwelling of attention upon them, by the pleasure which accompanies success. In short, the law of survival of the fittest by natural, or, in this case, functional, selection, assures the persistence of the reaction thus gained by effort.

We may merely note in passing, also, that this theory of the process of voluntary attention is not open to the objections commonly urged against earlier views. How can we conceive the relation of mind and body? The alternatives commonly recognized are three: either the mind interferes with brain processes, or it directs brain processes, or it does nothing; these are the three. Now, on the view here presented, none of these is true. The function of the mind is simply to have a persistent presentation — a suggestion, a 'copy.' The law of motor reaction, plus the accumulated excess, does the rest. The muscles express the influence of the central excitement; this sets inwards as more excitement, which we call attention and emotion, and this the muscles again express; and so on, until by the law of lavish outlay, which nature so often employs, the requisite muscular combination is secured and persists. In the words of Ziehen, "the appearance of the concomitant psychical processes themselves is the only fact that needs explanation. . . . The fitness of actions is quite conceivable as the result of natural laws." [1]

[1] *Physiol. Psychology*, p. 274. Ziehen recognizes the essential sameness of the selecting process for reflex (phylogenetic) and voluntary (ontogenetic) selections. He says: "In both cases the process of selection is the essential factor in the development of this fitness. In the case of reflex action . . . this selection is essentially a phylogenetic process: in the case of [voluntary] actions, it is an ontogenetic process."

Besides the general fact that this view makes the stimulus or copy the essential thing for reproduction, it takes another step as necessary for psychology, I think, as the former is for general biology: the identification of voluntary attention with motor reaction, at once habitual, in the main, but yet 'excessive,' in part, in the centres of highest co-ordination. Attention is essentially an accumulation,[1] due to continued selection in racial evolution.

This is considered a grave question by many who forget that whatever the voluntary life is, every child has to pass into it from the involuntary life, *without a miracle;* and it may be well to present some general considerations in addition to the facts of infant life now mentioned.

1. It should be remembered, I may repeat, that the problem of accommodation is really the problem of selection. How does an organism *select* the stimulations which are profitable to it? It is in answer to this question that the 'excess' function is postulated, and has been in the 'increased nervous discharge' of biological theories of the Spencer-Bain type. Now in attention we have, undoubtedly, the one selective function of consciousness. Who claims anything else? Whatever attention may do besides, all the selections which consciousness makes are due to it. We have, therefore, the requirement that these two things should be connected in theory, *i.e.* the adaptations of lower organisms, and the selections of consciousness. Now it only gives further strength both to the theory of the biological selections of the lower organisms, and to that of the conscious selections of the higher, if we find that one psycho-physical principle — such as

[1] This gives a mass of 'funded' process or internal congenital function which all new learning starts with. This is put in evidence by Jennings (*Behaviour of Lower Organisms,* 1906). The position taken here fully allows for this as against the 'simple reflex' process of a more mechanical theory.

'selection from overproduced movement' — runs through the entire development.

2. Again, the conscious value of a stimulus to the organism is, on the whole, its pleasure-pain effect. This we have identified with some form of psycho-physical process, in the nervous centres, which tends to discharge in the excess wave. In this again, as has been said, we are following the best theories of the past (Darwin, Bain, Meynert). If now our proposition concerning attention be true, it would follow that in the higher representative processes, attention is the great locus of hedonic consciousness. It is only necessary to reflect upon the conditions of 'ideal tone' — the pleasures of the intellectual and emotional life — in the exposition, for example, of Ward and the Herbartians, to be convinced that this is true. Developmental considerations enter here to complicate the case;[1] but it is sufficient to note in this place, that pleasure is, in lower organisms, a sign of vital profit, and, by its discharge in the excess wave, an agent of adaptation; and the same is true of intellectual and sentimental pleasure and profit. They indicate conscious adaptation by the phenomenon of attention, which is the genetic channel of an excess wave the same in kind. All the evidence which goes to show that no movement can be made unless the attention gets fixed upon some idea that represents this movement, and that no movement can be prevented upon the representation of which (itself or by proxy) the attention is fixed — all this evidence shows also, that attention is some kind of generalized motor phenomenon. Generalized, because it bears equally on all presented contents. All initiation of voluntary movement is a matter of attention, and all voluntary inhibition or control of movement a matter of withdrawal of attention. Now this is just what the excess wave ought to do — come to the aid of

[1] See below, § 3 in this chapter, on the 'Development of Attention.'

that which claims it by the right of accumulated selections, that which, by this aid, is again selected, and by its withdrawal prevent that which should, by the same tests, be neglected and eliminated.

§ 2. *Reflex and 'Primary' Attention*

I have elsewhere argued for the view that reflex attention is an affair of motor association. The facts so evidently show that there is no mental initiative in the case of a violent drawing of attention — as by a clap of thunder, or a flash of light — that the problem is, not to prove that the entire psychological phenomenon is a change in the content of consciousness, but merely to determine what kind of a change it is. I have proposed to call consciousness when occupied with such reflex attention 'reactive,' since the essential thing about reflex attention is the attitude or reactive condition in which one finds himself as soon as his surprise — after such a clap of thunder — allows him to ask himself the question. Certain muscular tensions, varying somewhat with the kind of sensation or image to which his attention is drawn — this seems to be all he finds. It seems quite in the line of fact, therefore, to say that reflex attention is a consciousness of a group of muscular and organic processes fixed in certain forms by habit.

The earliest form of attention, however, is that brought out in low organisms by sense stimulations. It may be called 'primary attention or conation,' in the phrase of late writers (Höffding, Ward), considered as the active side of consciousness. It is by indulgence only that the term 'attention' is used for it, since when we use that word we have in mind so distinctly the exact tensions and contractions habitual in our developed lives of attention. But if the general view now advocated be true, we should expect to find, in all consciousness, the presence of such a motor element; and while in any particular case the 'motor associates' may not be special enough to give well-marked tone to the content, yet it should, in its real nature, be called a phenomenon of attention. The place of this early attention may be made plainer in the next paragraph.

§ 3. *The Development of Attention: Sensori-motor Association*

Assuming the answer now given to the question of the mechanism of speech, considered as a typical voluntary function, some additional considerations arise which bring us back to our problem of the development of attention.[1]

In the first place, I find in my own case and from experiments with others, that the presence or absence of elements of movement in the consciousness of a word depends in many individuals largely *upon the direction of the attention.*[2] If the attention be directed to the vocal organs, — either one's own, or some one else's, — movements of the tongue, lips, and larynx are clearly felt in the organs, sometimes also by touch, and may be seen. If, on the other hand, the attention be directed to the ear, and the words be thought of as sounds, these muscular sensations fall perceptibly away or disappear. This indicates that there are two great speech types, a motor type and a sensory type, according as the attention is given in one direction or the other — a distinction of types now familiar in connection with reaction-time experiments.

The reaction time is, in a great percentage of cases, shorter

[1] See the article already mentioned in the *Philosophical Review*, II., 1893, pp. 385 ff., for the statement of some of these points, with observations.

[2] Paulhan notices this influence of the attention (*loc. cit.*, p. 43), but does not inquire into it.

when the attention gives a so-called 'motor' reaction, *i.e.* is directed to the reacting member, rather than to the signal. I have experimented to some extent with a view to finding in what per cent. of individuals one kind of hand reaction is normal as against the other kind. The results show that, among uninstructed groups of students, reacting for the first time in the laboratory, about one-quarter of the entire number, when questioned immediately after giving a series of sound-hand reactions, were clearly conscious of having paid attention to the movement of the hand. The average time of their reactions is considerably lower than the general average. This result shows clearly, not only that the difference in time of the two kinds of reactions is a real difference in many persons, but also that there are individuals who normally react most readily, and most effectively, in one way or the other. One of the bearings on speech is this: it becomes at once evident that the most rapid speakers are generally, *ceteris paribus*, 'motors' in their type. The direction of the attention serves to arouse the organs of speech in advance, by an influence the nature of which is still to be explained.[1]

Now certain questions arise here which are directly pertinent to our present topic: Is a person motor, visual, or auditory, in his speech, and in his reactions generally, because he has strengthened a particular kind of memories by the prevailing concentration of his attention upon them? Or does he give motor or sensory attention and reaction, because of the predominant strength of a certain class of his memories? Probably *both of these positions are true;* and each of them is of great importance in the education of speech, and other motor functions, as well as for the theory which is here

[1] To quote my own case again — I find it impossible to think of a French sentence without keeping my attention on the *visual* picture of the printed signs; but I can follow a German sentence by memories of *speech movements* with no trace of visual attention.

developed. The case seems to be the exhibition, on a large scale, of what we find to be true of the relation of attention to sensations generally. Increased intensity of sensation tends to draw the attention; and the attention increases the intensity of sensations. It is one of those processes of 'reasoning in a circle' which characterize the growth of body and mind together. Another instance is this, for which we have already seen some probable reasons: pleasure arises from healthy function, while healthy function is directly assisted by pleasure.

The relation which we have now discovered, however, between a person's 'type,' and the movements and habits of his attention, is capable of a clear psycho-physical explanation.

We know that increasing intensity of sensation liberates energy increasingly toward the motor centres. A strong sensation tends to excite more movement than a weak one. It is probable, therefore, that a given degree of intensity of each particular sense-quality involves a motor ingredient, as an element in its conscious value — be it in part due to a setting-back process from the motor centres themselves, or in whole to the stirring up of revival processes in the kinæsthetic centres. The distinction between sensory and motor consciousness is largely logical; all consciousness is both. Every sensation reverberates outwards in the muscles, and this muscular resonance reacts back upon the sensory factor. But it is clear that the largest amount of the motor 'ingredient' attaches to the most intense sensation.

Now we also know that the exercise of attention involves a large amount of motor process; its constant and necessary accompaniments are motor. Consequently the rising tide of motor incitation due to the rising intensity of sensation is an increasing stimulus to the attention, by a radiation of processes in the centres of movement. So we have a valid reason for the general fact that an increase of intensity of sensation tends to draw and hold the attention.

On the other hand, the ordinary opinion is true, that the idea of a movement is already the beginning of that movement. In the light of this principle it is easy to see that, when I turn my attention to a sensation, I in so far start into more vigorous existence the motor ingredients and associations of that sensation. This in turn tends to bring out more intensely the sensory ingredients, and so the second aspect of our 'reasoning in a circle' is made clear; *i.e.* that attention heightens the intensity of sensations.[1]

This process of radiation, or mutual overflow, among the different motor centres — if they be different — is not hypothetical. All theories demand it. It is simply a question, in any special case, as to how far the circle of influence of one motor process may extend to neighbouring fibres and cells. And if the theory be true that attention is just the most habitual of all forms of motor reaction — because extending far back in the race history of organic accommodation — then the direct arousing of the attention by changes in mental content is fully explained in the way supposed.

To put the matter in a nutshell — just in so far as the motor ingredient of a mental content of any kind is large, that is, in

[1] On the original publication of the article containing this position, Professor Höffding, in a private letter, called my attention to the following quotation from his *Outlines of Psychology* (p. 316), which clearly takes the same general ground as to the cause of heightened intensities when attention is aroused: "It is possible that impulses return from the centres with which the voluntary concentration of consciousness is linked, to the centres of sensuous perception (as in other cases to motor centres), in which way their effect may be strengthened. *This would be the physiological form of the psychological fact that an idea becomes clearer if we give ourselves up to picturing it*" (italics mine). See also his reference to Wundt (*Physiol. Psychologie*, I., pp. 233 f.).

so far as the sensory ingredient is intense, just to this degree will the direction of the attention be secured, and to this degree also will both the ingredients be intensified by this act of attention. The two facts, therefore, that intensity draws attention, and attention increases intensity, may be stated in terms of a single principle which I venture to call, in view of the doctrine of association already explained, the 'law of sensori-motor association,' *i.e. every mental state is a fusion of sensory and motor elements, and any influence which strengthens the one, tends to strengthen the other also.*

The reflex attention which follows upon increased intensity of sensory excitation may be considered, therefore, in conformity with what has already been said, the return wave of revived motor associates; and the increased intensity which follows the direction of the attention is due to the presence of this return wave, by the reverse association.[1]

This principle also goes far to explain the relation to each other of the two so-called laws which are usually stated independently in connection with reaction times: (1) greater intensity of stimulus diminishes the reaction time, and (2) motor reactions are generally shorter than sensory. Both are ready deductions from the 'law of sensori-motor association.' As for the first law, that more intense stimulation gives a shorter reaction than less intense, the reason of it is now evident. It is because the more intense stimulus arouses

[1] Wallaschek (*Zeit. für Psychologie*, VII., Heft 1, March, 1894, p. 67) criticises this view on the ground that only in persons of the motor type — of speech, for example — would there be the necessary 'motor associates.' But this is the reverse mistake to that made by Féré, noticed above in another connection, who says that the law of dynamogenesis makes it necessary that all should be 'motors' in type. Both fail to distinguish between the general dynamogenic influence of a stimulus, which, by the law of 'sensori-motor association,' implicates the attention, and, on the other hand, the kinæsthetic motor images of memory, which represent the particular movements, easy attention to which marks the 'motor type.' See also Appendix C, II.

more and stronger motor associates; or, put physiologically, because it has greater dynamogenic effect, and so facilitates motor discharge, both directly into the reacting muscles, and indirectly by its readier influence in getting the attention.

Now as for the second fact, which holds for the majority of people, its explanation also follows. Experiments show that the reaction time is shorter when the signal is foreknown and the attention is consequently not drawn to it, but is left free to seek some further facilitating cue. This cue is found, of course, in persons accustomed to depend upon their motor memories for various voluntary actions, in the thoughts of the movements actually to be made in reacting. And so the 'motor reaction' is directly prepared for. In these cases, a particular kind of motor association is emphasized by the direct act of attention. The motor associates are pictured, dwelt upon, emphasized beforehand, the motor centres are put into a state of high potential, the stimulus is left to discriminate itself without attention — and thus the reaction time is shortened. It is evident that in the sensory reaction, part, at least, of the dynamogenic influence of the stimulus goes with the attention, for the discrimination of the signal, etc.; while, in the motor reaction, it all goes into the reaction, which is already prepared for by motor attention.[1]

It is an evident corollary, also, that only in persons of the motor type would the motor reaction be shorter than the sensory; for it supposes a ready habit of using motor memories mainly in voluntary movement. Persons trained, however, to use auditory and visual memories as the instrument of

[1] It is only what we would expect that, when the stimulus (signal) is not intense enough to carry its own discrimination, either the reaction takes place upon a false stimulus, or the attention shifts from the movement to the stimulus, and the time is lengthened.

attention, find their reaction time lengthened [1] when they come to pay close attention to the movements which they are about to make.

Applying this thought to the rise of speech and its method, we find abundant reason for the variety of types found among adults. Visual, auditory, and motor memories of words date back to early childhood, and do not arise synchronously. Visual pictures of figure arise and get comparatively fixed in childhood some months before the child begins to speak or write, as is shown by its recognition of simple figures, animals, and later, letters. Auditory images, also, date very far back; this is seen in the very early recognition of words heard. Special graphic memories, on the contrary, are the latest of all. The ability to trace outlines which have been already recognized,[2] arises only after considerable progress has been made in speaking, and the progress in speaking is, in turn, relatively much later in its rise than visual and auditory recognition. So the probable order in which these different elements of the speech faculty would come under the jurisdiction of the 'law of sensori-motor association' is about this: auditory, visual, speech-motor, hand-motor (writing) memories. And a similar genetic analysis might be made out for other complex activities, if the facts were carefully observed.

[1] Cases in which the sensory time was shorter than the motor have, in fact, been reported by Cattell (*Phil. Stud.*, VIII., 1892, p. 403), Flournoy (*Arch. des Sci. Phy. et Nat.*, vol. 27, p. 575, and vol. 28, p. 319, quoted in *Rev. Philos.*, April, 1893, p. 444), and Baldwin (*Medical Record*, April 15, 1893, p. 455). See also Titchener, *Mind*, October, 1895, and April, 1896; Angell and Moore, *Psych. Rev.*, May, 1896; Flournoy, *Quelques Types de Réaction Simple*, 1896. The explanation given in the text was proposed by me in the paper cited. See my extended report of results with discussion of those of Cattell and Flournoy, and a new case, in *The Psychological Review*, II., 1895 ('Studies from the Princeton Laboratory,' p. 259), and a defence of the 'type theory of simple reaction' in *Mind*, January, 1896.

[2] What is called 'tracery imitation' above, Chap. V., § 1.

This means that auditory and visual memories get a good 'start' on the other varieties in the genetic process. They acquire considerable influence over the attention, which is largely reflex at that early period, and they become in turn relatively easy of revival, before the specific motor memories are well begun. Here is sufficient reason — quite apart from congenital tendencies which may be the controlling factor — for the existence of auditory and visual speech types. Habits thus arise which, on the mental side, express the readiest sensori-motor associations. They amount to what some have called 'pre-perceptions,' or better, perhaps, 'pre-apperceptions.' On the physical side these habits represent preferential dynamic tensions among those paths of discharge whose functions merge, in common, in that of the attention. The law signalized above tends, of course, as life advances, to consolidate these particular sensori-motor couples; and so one particular kind of attention tends to become a permanent trait of the mental life, unless the other connections which are subsequently brought into use, be of sufficient strength to supersede that originally most used. This latter, however, may happen in any of several instances: either from inherited tendency, or from the strength of other motor habits; or, in course of time, by dint of continued practice in one selected kind of attention.

It would seem, accordingly, that the 'auditory speech' type should be found most frequently among unliterary people, and among those who have not had extended linguistic training, or large practice in writing and reading. The particular influences which are lacking in this type are present in the training which the attention gets in people of the 'motor type.'

We have now reached, by the psychological and genetic analysis of speech, a result which, it is evident, confirms our general theory of attention. The law of 'sensori-motor association' is a generalization on the side of consciousness, from particular cases of dynamogenesis, each of which shows, on the nervous side, the working of the law of 'functional selection.' It is just by and for this, as we have seen, that attention has developed. It is a reaction of motor character upon sense qualities and mental contents generally, varying in its degree of ease and effectiveness, according to the amount of habit and structural growth. On the other hand, the law of 'functional selection' of movements is a generalization of the nervous process by which each of such habits gets started, as representing a new accommodation of the organism.

Closer observation of states of attention also leads us to note some more facts and their explanations. We find on examining consciousness, that attention is not a fixed thing, a faculty, any more than are memory or imagination. Yet in much of the literature of late years, in which the 'faculties' have been scouted, I know of no author who has applied his own criticisms consistently to the attention. Attention is still treated as a constant quantity, a fixed thing, the same for all the exercises of it, and for all the contents to which it gives its reaction. Memory, on the contrary, is now known to be a function of the content remembered; and not a faculty which takes up the content and remembers it. So we have no longer one memory, but many: visual, auditory, motor memories. Yet the very same thing is true of attention; *we have not one attention, but many.* Attention is a function of the content, not a faculty that takes up the contents; and it is only as different contents attended to, overlap and repeat one another, that they have somewhat the same function of attention.

It is easy to see, however, why it is that attention has been left largely untouched in the recent reduction of mental functions to changes in content. It is for just the same reason that the notion of self has been left over by criticism likewise, as was intimated above.[1] The reason is a genetic one. It is evident that here, as in many other cases, we have to note the tendency of many sensory stimulations to discharge themselves through common motor channels. The contrast between pleasure and pain tends, of course, to make a great line of division between the motor associates of some contents and those of others; such as that between reaching and withdrawing movements. As the senses develop, further divisions arise. But it nevertheless remains true that a balance of motor contraction, reverberation, effort, is common to all contents, and so becomes part of the fixed expression of all definite states of consciousness. This fixed grouping of motor elements is, in its reaction upon the content which arouses it, the fixed element in attention (certain tensions of brow, jaws, skin of head, etc., — the *A* element in the formula given above for attention[2]); and this makes attention seem to be a faculty of constant value. So it is that certain organic and muscular feelings contribute a certain sameness to the sense of self.

But this is not all. The actual content of attention feeling is *half different, more or less, from sense to sense.* We have — *i.e.* I have — a feeling so different when I attend to a sound from that when I attend to a light, that it is with the greatest difficulty that I find any strains or stresses in head, body, or limb quite the same in the two. And when we come to the difference between attention to any such sense content and attention to an ideal content, — even though the latter be the memory of the very same sense-

[1] See above, Chap. XI., § 3. The chapters of James and Bradley (*Appearance and Reality*, Chap. IX.) are remarkable exceptions, however.

[2] Chap. X., § 3.

thing, — the whole feeling of attention is again extraordinarily changed. In all these cases the content felt as attention is motor; but it is yet as varied as all the other habitually varied motor responses which have been found useful in the race history of the organism. Its variable elements are the $a+\alpha$ values of the formula $A+a+\alpha$.

Very cursory observation of certain animals shows these facts in forms fixed by their varied habits of life. One has only to ride an intelligent horse regularly to be convinced not only that most of his mental processes may be conducted through his ears, — an effect exaggerated, perhaps, by the 'blinders' which are put over horses' eyes when in harness, — but that his *attention* is then auditory. He shows his hopes, fears, expectations, curiosities, etc., by ear movements. In the rabbit and other animals in whom the olfactory lobes are largely developed for purposes of utility, a distinct type of memory and attention is probably developed in connection with smell, an olfactory type. The constant movements of the tip of the snout in many such animals when exploring for food, etc., by smell, shows the development of delicate smell-motor reflexes analogous to our eye-motor reflexes and the horse's ear-motor. Attention in these cases is probably reactive largely, but for that reason its connection with one sense is all the more simple and striking.

Cases from pathology, also, show the actual dependence often of a particular motor function upon the single sense which trained the attention in the learning of this action. Bastian [1] quotes the case of an aphasic patient, who spelt aloud a word wrongly as he *wrote* it (*candd* for cat), but at the same time pronounced it correctly, as he heard it. This means that his spelling movements, letter by letter, had been learned in association with the making of the letters

[1] *Brain as Organ of Mind*, pp. 60–62.

and the sight of them, while the learning of the word pronunciation, as a whole, had been in connection with its sound.

But further still, in the same line. I do not think that we ever — even in successive attentions to the very same thing under the most uniform conditions — have exactly the same attention feeling twice. Why should not attention, like everything else, be subject to the changing effects of habit and accommodation? Indeed, it is the very outcome and exponent of these principles, as I have just been arguing. And then, too, dynamogenesis, the basis of all the excess energies which are crystallized into habits, still works on, and is working on in every attentive reaction which we make. For all these reasons, we see that no two acts of attention can be just the same.[1] And the variable element is the α of the formula.

One additional point may be merely noted here; it has had some enforcement in earlier chapters. We should expect this change in motor reaction, from act to act of attention, to have some equivalent in consciousness; some equivalent apart from change in the particular content itself which stimulates the attention — some generalized, vague, unanalyzable feelings. And so we have found. *Recognition* is one such feeling, and *Belief* is another. I have argued independently over them both — apart from the genetic aspect of the case — and found them to be just this, felt attitudes toward particular contents.[2]

[1] I think it would not be difficult to test this theory of attention by the dynamogenic method of experiment suggested by Münsterberg, *The Psychological Review*, 1894, 441 ff.

[2] Cf. Chap. X., § 3. On Belief, see my *Handbook*, II., Chap. VII., the genetic theory of belief is worked out in the later work, *Thought and Things*. The doctrine of Recognition, based on the law of 'sensori-motor association,' was published in the *Philos. Review*, July, 1893. Professor Höffding, in a private communication, makes the criticism that, on my view, we would con-

§ 4. *Voluntary Acquisition and Control*

We are now in a position to see that voluntary movement has three distinct stages of development in each individual. We find the mind at first occupied with an *object*, presentation, or stimulus, which starts a muscular reaction, either native, acquired, or at random. Then a little later we find the mind occupied with a *presentation or idea of the movement thus made*, which, with its associates, tends to stimulate the corresponding motor processes, and thus to bring about the same movement. And at last we find the mind occupied with an *object* again, for the attainment of which the movement is a necessary but now a subconscious means.

The original 'end' of volition, therefore, is simply the image or picture which starts the imitative reaction. Suggestion turns out to be an original motor stimulus in volition, as truly as in the lower activities. The child attempts to speak, for example, with no attention to his organs of speech. He then learns that it is by muscular effort, by persistent imitation, that he must proceed. Accordingly, the muscular movement now becomes his end. He strains to set his vocal organs properly. His efforts to control the organs, however, throw him, at first, into great confusion and failure. But after more muscular control is acquired, the third stage gradually follows, as the movements become habitual. The

fuse two qualities which had been repeated the same number of times. This would mean that we have no differences of attention for the different sense qualities. But it is evident that that is not true, if I am right in saying that the actual motor content, *a*, is different for each quality, and that we so have *different attentions*, just as we have different memories, etc. His criticism shows — what I said above — that even the best psychologists still look upon attention as a relatively fixed 'faculty,' rather than as a shifting function of content.

end is now again a picture or object, and the muscular consciousness falls into the background, as, for example, in our developed adult speech, when we think only of the ideas which we wish to express.

The theory of motor development now worked out throws light also, I think, on the vexed question of muscular control — the regulation of movement in amount and direction, and its suppression, etc. It is easy to see that the material of volition, the ideas or copies attended to and imitated, are the means of holding the course of each movement in check by association. I can repeat a movement only because I am able to reinstate in memory the feeling of it, the copy elements of it. But by association, as we have seen, other elements, such as visual, or auditory, or touch, memories, may stand for the muscular memories. The whole management of a movement, therefore, depends upon the getting hold *by the attention* of the series of positions desired for the limb moved, and this can be done only by filling up the attention with the proper copy elements of sight, hearing or other, which release the proper series of motor discharges, and these discharges only.

The current theory of 'control' lends itself directly to this view, hinging, as it does, upon the matching, term by term, of the movements being accomplished with a remembered series, whether of sight, sound, or what not. The control of handwriting described above is a good instance.[1] The current theory, however, neglects the process by which the series to be matched is vividly held up for voluntary reproduction.

This lack we have attempted to supply. The view of attention given in what precedes, teaches us that the motor reaction of attention is a function of the content attended

[1] Above, Chap. V., § 2.

to, on the one hand; but, on the other hand, it is a part of the motor process in which the whole content finds its dynamogenic expression. The office of attention, therefore, is that of fixing the content steadily, on the sensory side, and at the same time of releasing the associated discharge movements, on the motor side. Attention has, in each case, as we have seen, grown up in exactly this way, both as an expression of motor reverberation from typical and constant accommodations, and also as itself the very beginning, by the law of 'excess,' of the useful discharges which are, in their acquisition, associated with the content in question.

Attention is the go-between between the copy imitated, and the imitation which copies it. It is, therefore, the *central and essential fact in all voluntary muscular control.*

A further application suggests the basis of a theory of inhibition. The inhibition of movement is of two kinds, positive and negative. Positive inhibition we have already found in many cases in the suppression of movements through pain. This is the basis of the direct intentional suppression of movements, even when pain does not attach to the movements as such; for with higher stages of mental development inhibition has become a generalized selected function though derived from particular adaptations secured under the stimulus of pain; just as is the case with positive movement which no longer has to be actually pleasurable. Negative inhibition, on the contrary, is just the absence of that attention which is necessary for the selection and preservation of a movement. Diffused excessive movements, which serve no purpose, are killed by the denial to them of that fixing attention which is necessary to render movements persistent, orderly, and habitual.

This theory of control by the attention seems so plain in its applications, that I have taken space for its summary statement here. Its development is not necessary, however, to the clear statement of our general theory, but it may be taken up in another place.[1]

[1] I intimated this theory of control in the article in the *Philosophical Review*, II., p. 406, from which I may quote: "The correlation of various images in the attention, through their respective 'motor ingredients,' is necessary for voluntary activity; and where a particular class of images is lost, the damage it works in the mental life is not alone the narrowing of the content of consciousness, but it is in many cases the withdrawing of that support, without which the voluntary function cannot proceed at all. It is the co-ordination of the attention, therefore, — what I have elsewhere called 'volitional apperception,' — that every one of the incoming sensory elements must have part, at least, of its regulating effect upon the efferent discharge. This is shown so clearly, as a matter of fact, in the elaborate article by Pick on the loss of voluntary movement by certain anæsthetics when the eyes or ears are closed ('Die sogenannte "conscience musculaire,"' *Zeitsch. für Psych.*, IV., 1892, 161 ff.), that I need not do more than recognize the support which my article gets from his. A collection of cases which show the extreme dependence of attention and voluntary movement, in persons of the visual type, upon vision, is made by Dr. Ireland in *Journal of Ment. Sci.*, January, 1893, pp. 130 f."

PART IV

GENERAL SYNTHESIS

CHAPTER XVI

SUMMARY: FINAL STATEMENT OF HABIT AND ACCOMMODATION

§ 1. *Summary of Theory of Development*[1]

AFTER the foregoing detailed statements of facts and theories, and the solution of certain particular genetic problems, we may come to a general synthesis. What is the least that we can say about an organism's development? Everybody admits that two things must be said: first, it develops by getting *habits* formed; and second, it develops by getting new adaptations which involve the breaking up or modification of habits — these latter being called *accommodations.*

The law of habit may now be stated generally in some such way as this: *Habit is the tendency of an organism to continue more and more readily processes which are vitally beneficial.*

This principle we have found an axiom in biology and psychology. In psychology great instances of it are readily cited — instinct, emotional expression, the performance of

[1] This section is not intended as a *résumé* of the entire book, but only of those points which are needed for the remaining sections of this chapter.

In the foreign editions a section is inserted here on 'Intelligent Direction and Social Progress,' topics treated in English in the work *Development and Evolution.*

movements pictured in the attention, even attention itself. In order to habit, it has become evident, the organism must have *contractility* — ability to make a response in movement to a stimulus — and then it must have *some incentive to make and keep making the right kind of movement.* The essential thing about habit, then, is this: *the maintenance of advantageous stimulations by the organism's own movements.* Now what is the incentive to the right kind of movement? The answer to this question carried us farther.

Three answers are possible. The only incentive may be the actual stimulus, altogether outside the organism, and the right movement may be only a chance selection from many random movements. This is the ordinery biological theory. The stimulus is supposed to 'come along' very often, and, moreover, to be very varied in its kind, locality, etc.; so that by repeating happy chance movements, habits are formed, and by compounding the habits, these habits become complex and varied. So the creature develops. On this view development is entirely an expression of the one principle of nervous Habit.

The second answer says: the incentive is in part, as before, outside the organism, that is, the external stimulus must remain constant; but the organism, after the first reaction to the stimulus, tends to repeat its *lucky reactions* again. This is the psychological theory. It finds in this tendency to repeat lucky movements the nervous analogue of pleasure, and makes it with the principle of *excess discharge*, following upon pleasure, the additional thing. There is thus an internal organic 'incentive.' By this the creature 'goes out,' and secures its own repetitions or avoidances, but only in the lines of lucky chance accommodations. This we have designated — in the principal form in which it has been held — the Spencer-Bain theory.

But this latter theory, superior as it is to the more mechanical or 'repetition' view of the biologists, has had in its statement a radical defect, the intimations of Darwin — who nowhere, to my knowledge, fully expresses an opinion — possibly excepted. It has held, in Spencer and Bain, that the pleasure or pain is from the first secured by *lucky adaptive movement.* This, I have argued above in detail, cannot be the case; for movements themselves reflect pleasure or pain only as they serve as stimuli, reproduce stimuli, or are associated with stimuli. On the contrary, the *stimuli as such* are the agents of good or ill, pleasure or pain; and this pleasure or pain process — index, as it is, of the fundamental vital processes — dictates the *very first adaptive movement toward or away from certain kinds of stimulations.* This is the third answer and the correct one. Otherwise the principle of excess — as in the form of the 'heightened nervous wave' of Spencer — only serves to confirm in habits the lucky adaptations already hit upon.

How shall we further conceive the process whereby, from many movements thus generally adated, some are *selected* as special adaptations, or particular motor functions? This, it is clear, is the question of *Accommodation.* It occurs by means of excess reactions. It is opposed to habit in two ways: first, it has reference to *new* movements, — a prospective reference, — while habit has reference always to movements more or less old, a retrospective reference, — and so it runs ahead of habit; and second, it tends, by the selection of new movements, to come into direct conflict with old habitual movements, and so to disintegrate habits. Let us look, then, at accommodation also more closely, gathering up what has gone before in earlier chapters.

In general formula: *Accommodation is the principle by which an organism comes to adapt itself to more complex* *conditions of stimulation by performing more complex functions.*[1]

Various functions have been shown in what precedes to illustrate this principle; all functions which the individual has *learned*. Learning to act is just accommodation, nothing more nor less. Speech, tracery, handwriting, piano-playing, all motor acquisitions, are what accommodation is, *i.e.* adaptations to more complex conditions. The common thing about them all is evident from the foregoing statement of the requirements of development: *the maintenance of stimulus by selection from excessive motor discharges.* This is *Imitation.* In brief, any reaction whatever, no matter how produced, — by accident, by suggestion, by obedience, by volition, by effort, under stress of pain or excitement of pleasure, — any reaction by which a useful stimulus is hailed back and enjoyed, or a damaging one fled from and escaped, — any such is a case of accommodation, and falls under the principle of 'circular reactions' or 'Imitation' now expounded.

But continued accommodation is possible only because the other principle, *habit*, all the time conserves the past and gives *points d'appui* in solidified structure for new accommodations. Inasmuch, further, as the copy becomes, by transference from the world to the mind, capable of internal revival, in memory, accommodation takes on a new character — a conscious, subjective character — in *Volition.* Volition arises as a phenomenon of 'persistent imitative suggestion,' as we have argued. That is, volition arises when a copy remembered vibrates with other copies remembered or presented, and when all the connections, in thought and action, of all of them, are together set in motion incipiently. The 'set' of motives together with a certain excess function is what

[1] Compare with these statements of Habit and Accommodation, those given above, Chap. VII., § 7.

we call attention; and the final co-ordination of all the motor elements involved is volition. The physical basis of memory, association, thought, is, therefore, that of will also, — the cerebrum, — and pathological cases show clearly that aboulia is fundamentally a defect of synthesis in perception and memory, arising from one or more breaks in the copy system whose rise has been sketched in what precedes.

§ 2. *Interaction of Habit and Accommodation*

We have seen — to proceed farther on our way — that there is one type of reaction, and only one, in which these two principles have a common application: *reactions whose issue tends to reinstate, in whole or part, the very stimulation that started the reaction.* Accommodation is there, in such a reaction, since the advantageous stimulation stands a better chance of repetition if the organism tends thus to get it; but since this repeated stimulus again stimulates to action, and action again follows — there also is habit. So accommodation, *by the very reaction which accommodates*, hands over its gains immediately to the rule of habit. And this is the universal rule.

How true, as a fact, this form of adaptation is! A fact often noticed, always admired, never explained — that organisms move toward the source of light and heat and colour! How can an organism get such a splendid property — that of being so modified by what is good for it, that it itself responds in a way to get it again, and then, by thus getting it again, makes its future enjoyments of it sure and easy? This the theories given attempt to explain: by the law of 'Excess' with functional selection the stimulus is maintained, and by the law of 'Sensori-motor association' the process is fixed in easy habit.

The interaction of these two principles, Accommodation and Habit, — Excess and Association, — gives rise to a twofold factor in every organic activity of whatever kind. In organisms of any development — where a nervous system, say, is present, — the environment being a changing one, every structure, with its function, represents a habit which is being constantly modified by the law of accommodation. But these modifications themselves, as we have seen, provide again for their own habituation; so there is a constant erosion, and a constant accretion, to the net attainments of the organism. And each function can be understood only in the light of both the influences which have contributed to it. Impulse, for example, is twofold; instinct is twofold; attention is twofold; emotion is twofold: each illustrates habit, but each has grown by changes due to accommodation. Is not this a reconciliation *in principle* of the opposed theories of these functions, one saying that these great organic functions came only by composition, and the other that they came only by selection, intelligent or biological.

§ 3. *Organic Centralization and Specialization*

We have now seen how great habits are formed. 'Natural' and 'organic' selection fix them, and at the same time render them more prominent, *i.e.* as instincts, by erasing the evidences of their origin, and abbreviating the phylogenetic process in the growth of the individual. I use the phrase 'organic centralization' to denote this great outcome of development, — the differentiation of functions in lines of adaptation which run apart, so far as their particular offices and structural products are concerned, but which are yet centralized. For they are centralized when considered together, as constituting, in unity and plan, the common life of the organism. When considered each for itself also, as a well-knit whole of many co-ordinated units, the same centralization is shown about a smaller centre; such as the movements involved in a particular instinct, or the series of movements of the facial muscles in an 'expression.' There would possibly be no need for further exposition of these points, since they are corollaries from the general theory already sketched, were it not that there are certain further applications.

There are two such applications which are new, I think, and which serve to gather into one point of view conflicting opinions regarding two of the most refractory facts in current psychology. I refer to the question of the existence of special nerves for pleasure and pain, or either; and to the attention.

The question arises: If accommodation is secured by a special form of reaction called 'excess,' what relation does this reaction itself sustain to the principle of habit? Does the excess function itself also become centralized? Does it tend to become a separate co-ordinated function, as other motor discharges do?

It is to be expected that, in so far as the environment in which an organism lives is constant, any accommodation reaction would, *taken for itself*, tend to become a habit. So far as the presumption goes, we should expect to find two great kinds of reaction implicated with pleasure and pain. The pain reaction would tend to withdraw the organism from the stimulus which gives pain; and the pleasure reaction would tend to bring the organism into closer relation with the stimulus which gives pleasure. These two kinds of reaction would be possible for any muscular group whatever. All that would then be required would be some sense organ which would distinguish between the conditions of stimulation which *regularly* give pleasure,

— reacting to them with the forward moving reaction, — and those which regularly give pain — reacting to them with the withdrawing movement. This is probably the case. It is directly confirmed by the views of Meynert, Richet, and Bain, as far as the character of the movements is concerned; and by the results of Dessoir and Goldscheider, as to the differentiation of the sense of pain. It then becomes a matter of scientific discovery whether actual pain nerves exist or not, in connection with any particular function. That depends upon what the race conditions of stimulation have actually been. If the pain stimulus has been regular and peculiar enough, possibly it has got itself a special apparatus; research must decide. But if not, then not. This latter, the negative, is probably the case with pleasure. The stimulus to pleasant function is so general and normal, that pleasure has not become well 'specialized' either in the organism, or, as is very plain, in consciousness. Yet in the special cases in which functions have been perpetual, important, and uniform, there we do find pleasure as acute and definitely localized as pain is, *e.g.* in the sexual function, as physiologists have noted; it is not at all improbable that this function has a pleasure nerve apparatus. So it is possible and probable that pain is both a sensation, and a *quale* or 'tone' of other sensations, emotions, etc.; a sensation, — if it has developed its own apparatus of reacting to definite, well-localized pain-giving stimulations constantly present; a *quale*, — because the organism is never completely balanced in its environment, the stimulations representing misadjustment and pain are not all constant, and there are demands for the more general function, as in the intellectual life. So the accommodation function of pain, in connection with all possible stimulations, must go on just the same whether there be a sensation pain or not; especially in the sphere of thought, sentiment, and the attentive life, since this is the latest, most complex, and least uniform kind of accommodation.

On the physical side, too, the matter seems clear. The excess process at the basis of pleasure and pain finds channels of outflow which serve over and over again for the reaction required to repeat the pleasure, or stop the pain. The same connection thus serving for many instances, becomes well-worn and habitual; and so a connection is formed — a circuit — for pleasure or pain, like the ordinary sensori-motor circuits. If light, for example, considered as constant stimulation, serves to develop, for its different intensities, an organ — the eye — and certain nerves, which react only to it, *as luminous;* why can it not also develop, in connection with certain of its intensities, a further organ and nerve which react only to it *as painful?* It is, indeed, inevitable that, under favourable conditions, such a pain-apparatus should be developed and fixed by natural selection.

This recognizes the distinction between 'pleasure and pain' on one side, and 'agreeableness and disagreeableness,' on the other, as developed in recent work. Pain as sensation-content is distinct from pain as *quale* of other contents. On my view, this is a distinction due to development. Pain, as sensation, is pain become *habitual* enough, under constancy of stimulation, to have its own apparatus, *i.e.* it is pain as *peripheral* function. Pain, on the other hand, as *quale* of mental content generally, is pain of irregular stimulation, or pain of *accommodation, i.e.* pain as *central* function. I do not agree, therefore, with Münsterberg, in finding in the movements of flexion and extension, which my theory requires in common with his, the *genetic* sources of 'agreeable' or 'disagreeable' tone. The whole theory of development, as I have shown above, if it is to move at all, requires that this accommodation pain or pleasure be due, in the first instance, to stimulus, and that the flexion and extension movements be the organic mode of accommodation to the pleasure or pain-giving stimulus.

Nevertheless, so great is organic complexity, when we come to take the principle of association into account, that, after all, in developed organisms, Münsterberg may be right in making the flexion and extension movements themselves the direct basis of the agreeable and disagreeable *quale*. For we have seen in the case of emotion that movements at first purely purposive, serving utility or accommodation to stimulus, themselves get, by association, to represent the degree of success or failure in accommodation, and so come themselves to give body to the emotion. In like manner, these flexion and extension movements may have passed, from being expressive or utility movements, to be the forerunners of the condition which they at first served only to express. And it may well be that they are thus an intermediate link between *quale* pleasure-pain, and sensation pleasure-pain. This is supported by the evidence — so far as it goes — which locates the nerve apparatus of sensation pleasure-pain in the muscles. On this view, it is for reporting flexion and extension movements that this nervous apparatus has developed; these flexion and extension movements standing in place of the pleasure- and pain-giving stimuli to which the organism has become accommodated.

Possibly the most important question which remains over, and upon which the distinction now made between original and derived pain reactions seems to throw some light, is that which concerns the relations of so-called 'systemic' to 'single-organ' pains. Theories divide on the question whether pains relate to the welfare of the system as a whole or to the welfare — nourishment, vitality, etc. — of particular organs. And on account of the conflicting evidence some throw over the 'welfare' theory of pleasure and pain altogether. The principles which we have seen to be operative in development, show us, however, that we are able to reconcile the contradiction, at least in some degree. If sensational pain be a specialized function with its own motor reaction, then in it we have the single-organ position confirmed, and are able to account for the conflicts which sometimes arise — as so many writers, from Mill to the present, have pointed out — between the welfare of the organism as a whole and that of the particular organ or part. On the other hand, the existence of the non-sensational or *quale* pain still remains as an index of central and deep-seated vital conditions, and makes its own claim to being the original derivation-form of the pain consciousness. Genetically, we cannot begin life history with single-organ pains; for apart from the impossible assumption, then, of differentiated organs, such separate and special pain reactions would not take the place of the general form of hedonic reaction which we have found in organic development. On the other hand, the existence of special sensation pains in connection with functions of particular organs, and the probable existence of pain nerves, testify to the difference, in highly developed organisms, of the two sorts of pain. Moreover, the fact that pleasure is not so evidently dualistic, — not clearly sensational at all, — this is an additional evidence that the distinction between systemic and single-organ function is, with respect to its hedonic aspect, as it is also, of course, in respect to its very existence at all, a matter of evolution.

And another application may be made of the principle of specialization. One of the objections most current to the view that the original pain reaction took the form of diminished vitality, suppressions of movement, contractions, and flexions, is that the facts show that often pain reactions are very violent. The struggles of an animal to escape painful conditions, to rid itself of its annoyance, to defeat its enemy by aggressive and offensive action, all this is notorious. How, it is asked, can this be if the function of pain, in its relation to movement, is essentially inhibitory? The facts again are indisputable on both sides. We have seen some of the facts in the foregoing pages. In considering special emotional reactions and attitudes, we saw the variety and intensity of those accompanying fear, anger, etc., emotions of a painful character.[1] But, on the other hand, we have also seen that the child and the little animal learn movements by withdrawing and suppressing those actions which issue in pain. How can this contradiction be reconciled? There are two influences at work, I think, — both already spoken of, — to which the seeming contradiction is due.

First, there is the principle of antagonism which Darwin used under the name 'antithesis' and which we have seen in an earlier chapter to show itself in the special form of muscular antagonism with the corresponding series of antithetic motor attitudes. Much of the violent reaction under pain is the positive use of the muscular combinations antagonistic to those through which the actual pain stimulation would discharge. When in pain from a movement, or from a mere condition without movement, we do not violently stimulate the same movement which brought the pain, nor the movements appropriate to continue the unpleasant condition. These are suppressed by the law of inhibition and withdrawal. But we do throw into violent activity certain antagonistic or associated muscular combinations whose action brings relief. The real 'excess' does not attach therefore to the pain reaction as such, but to the benefit-bringing actions which are the proved resources of the organism when in conditions of pain.

[1] Chap. VIII., especially § 4, may be read in connection with the following explanations.

Second, there is no reason that the pain reactions themselves — the reactions of withdrawal, retraction, flexion — should not be at times intense. We have seen that by the principle of centralization, reactions of the imitative type, whether they be painful or pleasurable, become habits. This tendency to habit, we now also see, has in the case of pain taken on a positive form in pain as sensation, with probably a nerve apparatus of its own. When this has once happened the response to pain condition would, by the law of dynamogenesis, be intense when the stimulation is itself intense. This would mean that in the growth of the organism it has been advantageous to respond vigorously to stimulations which were damaging and so to get rid of them. That does not disprove the contention that the normal response to pain is a lessened one. It is as if a man put more money into a losing venture as the most effective way to turn it into a gaining venture; and it simply means that in business, as in development, it is only at a higher stage that certain complex conditions realize themselves at all.

Putting these explanations together there does not remain, I think, much evidence, apart from those convulsive semi-pathological chaotic writhings and twistings into which violent physical pain may throw the organism, that pain reactions as such are ever expansive and aggressive.[1] They may be intense,

[1] In addition to these two general reasons for the seeming antithesis on this point, we should expect the difference between 'systemic' and 'single-organ' pains to complicate the cases still further. For a reaction may be evidently in excess from one point of view, and not so from the other. The seeming excess movements of physical pain are generally in their character, as was said, those of antithetic habit, and so represent systemic methods of defence and offence. The direct withdrawals and inhibitions, on the contrary, represent the more direct response to the particular pain stimulation as such. The whole case serves to teach the lesson that no single class of facts derived from the mature and complex organism should be considered alone, or lead us to prejudge a case in which genetic processes have been

they may be associated with all sorts of utility reactions, and they may represent nothing but sheer mechanical revolt, as Darwin long ago showed.

Now the same effect of 'centralization' is seen in the attention, as may be gathered from the positions already taken. Attention has been defined as genetically the reverberation of the 'excess' process as it has become fixed in habit. By the law of 'sensori-motor association,' this backward wave gets connected with all the sensory processes. Now just in as far as this wave is the same for different sensations, just in so far it tends to be 'centralized,' in a constant function — integrated into a habit — involving a regular set of motor phenomena, such as the wrinkling of the brows, setting of the glottis, etc., always found in acts of attention. The organism thus acquires a *habit of accommodation*, on a higher level. This is attention. When memory and imagination appear, this new form of response enables the organism to throw itself into attitudes favourable to the best reception and assimilation of material of all kinds.

Yet as with pain, so here. This attention-habit, this centralized function, is not all that the attention is. The original excess function must be kept in view. No preliminary setting of attention is an adequate accommodation to an intellectual stimulus, an idea still to be received; it is adequate only to hold stimuli by which it has been before excited. Each new accommodation to idea carries a motor excess discharge of its own, and this also enters into the sense of attention, making each act of attention, and each sense-type of attention, different, as was said above.

The terms of interaction of the two principles, finally,

concerned; and on the other hand, the enormous complexity of these genetic influences should make us to the last degree moderate and undogmatic in our support of theories.

require that the reaction maintain its stimulus, and that this stimulus again repeat the reaction. The one type of reaction, therefore, which an organism must have, is a 'circular' or stimulus-repeating one. We have found it best to name this type of reaction, for purposes of psycho-physical definition, IMITATION, and to call it, as a typical neurological function, 'circular reaction.' This is the UNIT, therefore, the essential fact, of all motor-development; and this shows the simplicity of the whole theory.

The place of imitation has now been made out in a tentative way throughout the development of the active life. It seems to be everywhere. But it is, of course, a matter of natural history that this type of action is of such extraordinary and unlooked-for importance. If we grant a phylogenetic development of mind, reaction of the imitative type, as defined above, may be considered the mode and the only mode of the progressive adaptation of the organism to its environment. The further philosophical questions as to the nature of mind, its worth and its dignity, remain under adjudication. We have learned too much in modern philosophy to argue from the natural history of a thing to its ultimate constitution and meaning — and we commend this consideration to the biologists. As far as there is a more general lesson to be learned from the considerations advanced, it is that we should avoid just this danger, *i.e.* of interpreting one kind of existence for itself, in an isolated way, without due regard to the other kinds of existence with which its manifestations are mixed up.

The antithesis, for example, between the self and the world is not a finished antithesis psychologically considered. The self is realized by taking in 'copies' from the world, and the world is enabled to set higher copies only through the constant reactions of the individual self upon it. Morally I am as much a part of society as physically I am a part of the world's fauna; and as my body gets its best explanation from the point of view of its place in a zoölogical scale, so morally I occupy a place in the social order; and an important factor in the understanding of me is the understanding of it.

The great question, which is writ above all natural history records, is, — when put in the phraseology of imitation, — What is the final World-copy, and how did it get itself set?

APPENDIX B[1]

CASES OF THE USE OF THE RIGHT AND LEFT HANDS RESPECTIVELY, GATHERED FROM THE REPORT OF COLONEL GARRICK MALLERY, ON "SIGN LANGUAGE AMONG THE NORTH AMERICAN INDIANS."[2] BY PROFESSOR LESTER JONES OF MIAMI UNIVERSITY, OHIO.

"In the main part of Colonel Mallery's paper, where the cases cited are used as merely illustrative of the writer's own subject, the following data for the problem of right-handedness have been obtained: —

No. of Cases cited	Left Hand used	Right Hand used	Both Hands used
66	1	37	28

"In about a thousand illustrations appended to the paper proper, the left hand is used distinctively alone twenty-three times.

"In the same appendix, in a dialogue of a hundred and sixteen signs used, the left hand acts distinctively alone five times.

"In the Natei narrative of seventy-five signs, the left hand is used distinctively alone three times, the right hand twenty-seven times.

"In the Patricio narrative of sixty-six signs, the left hand is used distinctively alone three times, the right hand twenty times.[3]

"It is worth observing that in the dialogue and two narratives, making a total of about three hundred signs, or less than one-third of the thousand signs cited, we find the left hand used alone eleven

[1] Appendix A (in the first and second editions) is an index of observations recorded in the volume.

[2] First Annual Report of the Bureau of Ethnology, Washington, 1879–1880.

[3] In the above series, only those cases have been considered in which the circumstances involved allow a choice of either hand.

times, or about one-half the full number of times occurring in the entire thousand cases. This would seem to indicate that the more reflective the thought becomes, the more the left hand figures, while in the isolated more unpremeditated forms, it is the right hand that invariably springs into action.

"Two illustrations must suffice to show the general preference of the right hand over the left. In describing Indians conversing about the camp-fire, Mr. Mallery writes (p. 340): 'Two Indians whose blankets are closely held to their bodies by the left hand, which is necessarily rendered unavailable for gesture, will severally thrust the right from beneath the protecting fold, and converse freely. The same is true when one hand of each holds the bridle of a horse.' Again, this preference is well shown in the gesture sign for sunrise (p. 371): 'The forefinger of the right hand is crooked to represent the sun's disk, and pointed or extended to the left, then slightly elevated.

"'In this connection it may be noted that when the gesture is carefully made in open country, the pointing would generally be to the east, and the body turned so that its left would be in that direction.'

"The two-hand movement in making a sign is used, perhaps, as much as the right hand alone; yet in almost every case of the double-hand movement the right hand takes the initiative and plays the active rôle, with the left as merely supplementary. For example, the sign gesture for 'hard' is made thus: open the left hand and strike against it several times with the right.

"Again, in making the sign gesture for 'done,' hold the extended left hand horizontally before the body, fingers pointing to the right, and cut edgewise downward, with extended right hand, past the tips of the left.

"Many signs appearing to be made by the left hand alone, on closer scrutiny can be included in the two-hand movement. For example, in the expression 'three white men,' 'white men' is made first with right hand alone; but to convey the meaning, the right hand must persist until the sign for three is made, which remains for the left hand to do. It is in reality a double-hand movement with the left to be used as necessity requires, supplementary to the right."

Note by the Author. — It is evident that this report supports the view that the right hand was pre-eminently the 'expressive' member in pre-historic times. The *common signs* among different tribes, found also in deaf-mute sign language, show that many of these forms of expression are not late conventions, but rather matter of real aboriginal usage. If, then, they date back to the period before the development of speech, we have much reason for believing that right-handedness is originally a one-sided expressive function. Cf. Chap. IV., § 2, above.

APPENDIX C[1]

I

ON PROFITING BY EXPERIENCE AND IMITATION

We may illustrate in the field of individual experience. Soon after birth a young chick begins to learn as we say 'by experience.' He pecks instinctively at all objects of appropriate size, and by trial learns those which are good to eat and those which should be avoided. How can this be called imitative? In the first place, we may say there is in consciousness only the visual image of the object, and the native reaction of pecking follows upon it. The result of this is to give the chick either a good or a bad taste. In the former case the experience of the good taste becomes associated with the sight of the object — say a caterpillar — so that at future meetings with the same sort of caterpillar, the instinctive tendency to peck is reinforced by the imitative tendency to repeat the good taste. This reinforcement tends to modify and even to supersede the original instinctive manner of reacting, as is readily seen in the way the expression of the instinct of pecking is modified by the experience. In the other case — that of a bad taste, let us say, using Professor Lloyd Morgan's[2] example of the taste of a

[1] In the foreign editions this is matter added on p. 290, to which it may be considered a footnote, illustrating the formulation there given in Italics.

[2] *Habit and Instinct*, pp. 41 f. I may also illustrate this principle by replying to a criticism by Professor Lloyd Morgan of the definition of imitation given above, *i.e.* a reaction which tends to repeat or reinstate its own

cinnabar caterpillar — the effect of imitation is the reverse. With the sight of the worm now comes up by association the bad taste. The imitative reaction is now to avoid the taste; this tends to keep the instinct of pecking in check; and by repetition gradually suppresses it altogether in the particular case of this worm. But now further, in both cases, the visual presentation of the caterpillar stands by association in the place of the taste, as the terminus of the appropriate reaction, which thus loses its original character as a reflex and also its acquired character as an imitation. The case may be taken as a typical one; since it illustrates, first, the acquisition of experience by the use of native reactions; second, the modification and differentiation of these native reactions by imitation and association; and third, the continued use of these modified reactions in connection with the original objective stimuli, through substitution.

And the full genetic application of the theory would account for the existence of the native pecking reflex in the chick as a selection of variations coincident with imitative accommodations found useful to individuals.[1]

II [2]

FLUCTUATIONS OF ATTENTION

An interesting confirmation of the theory of attention as motor phenomenon is afforded by recent experiments of "fluctuations of

stimulus. Professor Morgan cites the chick which crouches or runs away when seeing others do so; this is imitative, although not reproducing the chick's stimulation (in that it cannot see its own actions) but only the 'onlooker's' (*loc. cit.*, p. 168). The answer is that in such cases there is an imitative reproduction by the chick of its own *movement sensations* which are associated with the sight of the equivalent movements in others. The latter (visual) stimulations are substituted in whole or part for the muscular sensations. Accordingly the action does reproduce both the chick's stimulation (muscular) and the onlooker's (visual). This makes untenable Professor Morgan's distinction (*loc. cit.*, p. 170 f.) between 'imitation' (instinctive) and 'copying' (intelligent reproduction by attention to the copy), although it is often convenient to observe it.

[1] Cf. also the cases given above, Chap. X., § 3.

[2] Note to p. 440.

the attention." It has been found by Dunlap (*Psychological Review*, XI., 1904, pp. 308, 319) not only that a barely audible continuous sound has periods of inaudibility, but that a just inaudible discontinuous sound reports its own breaks in some way, even though it does not become audible. As I interpret these results, — variations in the concentration processes of attention result in varying intensities of the sound, even to inaudibility; and, on the other hand, interruptions in an inaudible sound produce variations in the reflex concentration processes which are felt and remarked even though the sound does not itself come above the audible threshold. In other words, the sensori-motor association is functionally and cerebrally so close that it works its results as between stimulus and attentive response whether or not one or both of the terms be clearly conscious, subconscious, or altogether hidden in a mass of irrelevant happenings (as in cases of distraction). It shows the operation of dynamogenesis in this particular response, the attention, of the delicacy shown for other responses by the cases of 'suggestion' reported above (in Chapter VI.).

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social questions, and a THINKER OF THE FIRST RANK. It constitutes a most formal and severe refutation of individualism."

Prof. MORSELLI, in *Rivista di Filos. Scient.*

"A systematic history of the mind of the individual as a social being has hitherto been wanting in English, and, if only on this account, the work of Prof. Baldwin before us would be highly acceptable. But it may safely be added that **no more important work** on the psychological foundations of ethics and sociology **has appeared for many years**, certainly since Mr. Leslie Stephen's book on ethics." — Prof. S. ALEXANDER, in the *Manchester Guardian.*

"Prof. Baldwin of Princeton University here follows up his admirable volume on *Mental Development in the Child and the Race* with a 'Study in Social Psychology' of the first importance to students of ethics, psychology, and sociology. These terms indicate but faintly **the extraordinary freshness and power** with which Prof. Baldwin has worked out the 'dialectic of personal growth' and the 'dialectic of social growth' in their incessant reaction. . . . The individual of the older psychology disappears before this more profound and searching analysis, which proves the existence of social elements in the person from start to finish. Sociology thus acquires a scientific basis which the older conceptions could not give to it. . . . It belongs with the best work of the most advanced psychologists of to-day, and the ablest psychological sociologists. Every sociologist who would plough a fruitful field must hereafter acknowledge a great indebtedness to this VERY PERSISTENT AND SAGACIOUS THINKER."

— N. P. GILMAN, in *The Literary World.*

"There is no doubt that in this book we have **a valuable contribution towards the literature of** a problem which may perhaps be considered **the problem of the age** — the problem, that is, of the relation between the individual and society."

— H. BOSANQUET, in *Mind.*

"It is by its vigor of method and power of argument that this book, like the earlier one, commands the attention of the reader. We find in it the most varied applications of the principle of imitation . . . and the study of these applications gives the author occasion for the most ingenious insights and the most original views. The chapters on genius, art, play, the action of crowds, are especially remarkable. A thousand facts of which we had never before seen the interest appear in a new light under his criticism." — M. HAVARD, in *Revue de Met. et Morale.*

"What we have in this work is a treatment of social psychology **so profound, so original, so striking** in its results, that it cannot fail to mark an epoch in the future both of sociological and of psychological thought. . . . The child is examined in his mental development, and the social results reached are as rich as they must be astonishing to one who has hitherto failed to approach problems of society from this simple point of view. One is reminded of Columbus and his egg; also the thought occurs that a little child is still leading us into the truth.

"The most impressive feature of Prof. Baldwin's work to one thinking of it as a whole is the new emphasis laid upon social forces. The philosophy of the eighteenth contury viewed external nature as the principal thing to be considered in a study of society, and not society itself. The great force in society was extraneous to society. But according to the philosophy of our times, as it finds expression in Prof. Baldwin's work, the chief forces working in society are truly social forces, that is to say, they are immanent in society itself. The importance of this change can scarcely be overestimated.

"Prof. Baldwin's work is one which no student of society can afford to neglect. It is one which will prove helpful to the teacher, and must profoundly influence the preacher who grasps its import. It gives us a social philosophy which makes possible a rational and helpful discussion of the problems of the day. Prof. Baldwin has already accomplished great things, and from him still greater things may be expected in the future."

— Prof. RICHARD T. ELY, in *The Expositor.*